Bathymetric Distributions of Pacific Ocean Perch (*Sebastes alutus*) off British Columbia. II. Size Compositions, by Sex, and Sex Ratios, for Specimens Caught by Off-bottom and On-bottom Trawl in Hecate Strait, Queen Charlotte Sound, and off West Vancouver Island, 1969-89

S.J. Westrheim and R.D. Stanley

Fisheries and Oceans Canada
Science Branch, Pacific Region
Pacific Biological Station
Nanaimo, British Columbia
V9T 6N7

2006

Canadian Manuscript Report of Fisheries and Aquatic Sciences 2763

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Canadian Manuscript Report of Fisheries and Aquatic Sciences

Manuscript reports contain scientific and technical information that contributes to existing knowledge but which deals with national or regional problems. Distribution is restricted to institutions or individuals located in particular regions of Canada. However, no restriction is placed on subject matter, and the series reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Manuscript reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1-900 in this series were issued as Manuscript Reports (Biological Series) of the Biological Board of Canada, and subsequent to 1937 when the name of the Board was changed by Act of Parliament, as Manuscript Reports (Biological Series) of the Fisheries Research Board of Canada. Numbers 1426 - 1550 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Manuscript Reports. The current series name was changed with report number 1551.

Manuscript reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport manuscrit canadien des sciences halieutiques et aquatiques

Les rapports manuscrits contiennent des renseignements scientifiques et techniques ques qui constituent une contribution aux connaissances actuelles, mais qui traitent de problèmes nationaux ou régionaux. La distribution en est limitée aux organismes et aux personnes de régions particulières du Canada. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports manuscrits peuvent être cités comme des publications complètes. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports manuscrits sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annual des publications scientifiques et techniques du Ministère.

Les numéros 1 à 900 de cette série ont été publiés à titre de manuscrits (série biologique) de l'Office de biologie du Canada, et après le changement de la désignation de cet organisme par décret du Parlement, en 1937, ont été classés comme manuscrits (série biologique) de l'Office des recherches sur les pêcheries du Canada. Les numéros 901 à 1425 ont été publiés à titre de rapports manuscrits de l'Office des recherches sur les pêcheries du Canada. Les numéros 1426 à 1550 sont parus à titre de rapports manuscrits du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 1551.

Les rapports manuscrits sont produits a l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

2007-00224

Canadian Manuscript Report of

Fisheries and Aquatic Sciences 2763

2006

BATHYMETRIC DISTRIBUTIONS OF PACIFIC OCEAN PERCH (*Sebastes alutus*) OFF BRITISH COLUMBIA. II. SIZE COMPOSITIONS, BY SEX, AND SEX RATIOS, FOR SPECIMENS CAUGHT BY OFF-BOTTOM AND ON-BOTTOM TRAWL IN HECATE STRAIT, QUEEN CHARLOTTE SOUND, AND OFF WEST VANCOUVER ISLAND, 1969-89

by

S. J. Westrheim and R. D. Stanley

Fisheries and Oceans Canada

Science Branch, Pacific Region

Pacific Biological Station

Nanaimo, British Columbia

V9T 6N7

©Her Majesty the Queen in Right of Canada, 2006

Cat. No. 97-4/2763E ISSN 0706-6473

Correct citation for this publication:

Westrheim, S.J., and Stanley, R.D. 2006. Bathymetric distributions of Pacific ocean perch (*Sebastes alutus)* off British Columbia. II. Size compositions, by sex, and sex ratios, for specimens caught by off-bottom and on-bottom trawl in Hecate Strait, Queen Charlotte Sound, and off west Vancouver Island, 1969-89. Can. Manuscr. Rep. Fish. Aquat. Sci. 2763: v + 104 p.

TABLE OF CONTENTS

Abstract iv

Résumé v

Introduction 1

Methods and Materials 1

Results 4

General 4

Goose Island Gully 5

Mitchell's Gully 7

Moresby Gully 7

Area 3D 8

Area 3C 10

Summary and Discussion 12

Acknowledgements 13

References 14

Tables 16

Figures 44

Echo Table 1 70

Echo Figure 1 71

Appendices 77

ABSTRACT

Westrheim, S.J., and Stanley, R.D. 2006. Bathymetric distributions of Pacific ocean perch (*Sebastes alutus)* off British Columbia. II. Size compositions, by sex, and sex ratios, for specimens caught by off-bottom and on-bottom trawl in Hecate Strait, Queen Charlotte Sound, and off west Vancouver Island, 1969-89. Can. Manuscr. Rep. Fish. Aquat. Sci. 2763: v + 104 p.

Size composition and sex ratios (% males) were compared in off-bottom and on-bottom trawl catches of Pacific ocean perch (*Sebastes alutus*) in Queen Charlotte Sound, southern Hecate Strait, and off the west coast of Vancouver Island, during 1967-89. Vessels employed were the R.V. *G.B. Reed*, chartered, domestic, commercial trawlers, and foreign trawlers. The latter operated only off west Vancouver Island (with Canadian observers aboard), and ostensibly targeted Pacific hake (*Merluccius productus*).

In the Queen Charlotte Sound-Hecate Strait Region, three types of off-bottom trawls were employed, but only the Engel (modified or unmodified) trawl exclusively sampled off-bottom fish schools. Photocopies of echograms from the *G.B.* Reed sounder were presented as examples of off-bottom fish schools. Principal results were: (1) off-bottom trawl catches consisted of Pacific ocean perch, other rockfishes, Pacific hake, or Pacific pollock (*Theragra chalcogramma*); (2) large catches of other rockfish were limited to rough bottom, where few, if any, Pacific ocean perch were caught, and the most common species was *S. proriger* (redstripe rockfish); (3) proportions of Pacific ocean perch in the off-bottom catches exhibited no consistent pattern with *G.B. Reed* on-bottom trawl catches; (4) size compositions of Pacific ocean perch in off-bottom trawl catches were consistently uni-modal, in contrast to bi-modal or multi-modal in the on-bottom trawl catches; (5) mean lengths of Pacific ocean perch in Engel-trawl catches were significantly larger, and sex ratios smaller (fewer males), than those in comparable on-bottom catches; (6) the general absence of small (young) fish in the Engel-trawl catches was unexplained; (7) a replicate sampling test for landings, from Engel-trawl catches, indicated only a mild perturbation in the size composition of males; and (8) no strong off-bottom echoes were detected beyond the bottom depth of 119 fms (218 m).

Principal results in the West Vancouver Island Region were: (1) size compositions of Pacific ocean perch in off-bottom and on-bottom trawl catches were uni-modal or bi-modal, without consistent pattern by sex or depth; (2) similarly, mean lengths also exhibited no consistent pattern for either sex; (3) the undulating pattern of mean length to depth, for off- and on-bottom catches, was analogous to a similar pattern observed for age-group mean lengths reported for on-bottom trawl catches, in a preceding report on the Queen Charlotte Sound-Hecate Strait Region; (4) sex ratios were consistently, and usually significantly, smaller in the off-bottom trawl catches than in the on-bottom trawl catches; (5) perhaps the most surprising result was the occasional large catch of adult Pacific ocean perch off-bottom, over depths of up to 460 m (251 fms), where the headrope was 105-270 m (57-148 fms) off the bottom.

RÉSUMÉ

Westrheim, S.J., and Stanley, R.D. 2006. Bathymetric distributions of Pacific ocean perch (*Sebastes alutus)* off British Columbia. II. Size compositions, by sex, and sex ratios, for specimens caught by off-bottom and on-bottom trawl in Hecate Strait, Queen Charlotte Sound, and off west Vancouver Island, 1969-89. Can. Manuscr. Rep. Fish. Aquat. Sci. 2763: v + 104 p.

Ce rapport fait état des résultats d'une étude portant sur la relation entre les longueurs moyennes selon l'âge et la profondeur, pour le Sébaste à longue mâchoire (*Sebastes alutus*), déduite de données relatives aux prises effectuées au chalut de fond dans les secteurs importants pour ce type de pêche en Colombie-Britannique. Des échantillons de prises capturées par le NO *G.B. Reed* (1966-1984) et par plusieurs chalutiers commerciaux (1978-1997) ont été utilisés. Les sites de pêche importants, pour lesquels des données adéquates étaient disponibles, étaient situés au large de la côte nord-ouest des îles de la Reine-Charlotte (MSA 1W et 2AW), dans le couloir Moresby (détroit d'Hécate Sud et détroit de la Reine-Charlotte Nord) et dans le couloir de l'île Goose (détroit de la Reine-Charlotte). L'accent a été mis sur la période 1980-1999, pendant laquelle tous les sites ont été exploités, et la méthode affinée de détermination de l'âge (« break and burn ») a été utilisée. Il n'a pas été possible d'étudier les variations saisonnières de la relation en question à cause de la présence de données inappropriées pour la période d'octobre à mars.

La longueur moyenne selon l'âge évolue en fonction de la profondeur selon trois modes : (1) un mode généralement horizontal, un seul nadir proéminent (MSA 1W); (2) un mode généralement descendant, avec plusieurs nadirs proéminents (MSA 2AW); (3) de forts nadirs dans le réseau, lorsque la gamme de profondeurs est importante (couloir Moresby et couloir de l'île Goose). Trois des modes montrent que l'analyse de la croissance linéaire des sébastes à longue mâchoire doit inclure la profondeur comme une des variables. Il est intéressant de noter la présence, dans le couloir de Moresby et celui de l'île Goose, de deux groupes, séparés du point de vue bathymétrique, composés de sébastes à longue mâchoire présentant des longueurs moyennes similaires selon l'âge, . Ce rapport contient également un examen d'autres études portant sur les variations spécifiques au Sébaste à longue mâchoire au large de la Colombie-Britannique et dans les eaux voisines.

INTRODUCTION

Pacific ocean perch *(Sebastes alutus)* exhibit horizontal (on-bottom), and vertical (off-bottom), bathymetric distributions. The former has received little attention, and the latter none, in British Columbia waters.

Westrheim (1970) described off-bottom schools, thought to be Pacific ocean perch, based on echograms, as being like clouds, stratus-like or cumulus-like. During that survey, no information was obtained as to their identity.

The purpose of this report is to compare size composition and sex ratio of Pacific ocean perch from off-bottom and on-bottom schools in Queen Charlotte Sound (Areas 5An[1]+5B), southern Hecate Strait (5C), and off west Vancouver Island (Areas 3D and 3C) (Fig. 1).

MATERIALS AND METHODS

OFF-BOTTOM TRAWLING

In the Queen Charlotte Sound-Hecate Strait Region, the R/V *G.B. Reed* was utilized in 1967, 1970, and 1973, and chartered domestic trawlers in 1968 and 1970-71 (Table 1). The charter vessels were employed by the Industrial Development Service (IDS) as part of a program to discover new marine resources. Off-bottom trawling was usually limited to smooth bottom, where the on-bottom trawl could be fished successfully.

Off west Vancouver Island, during 1988-89, length-frequency samples of Pacific ocean perch were collected by Canadian observers aboard foreign vessels ostensibly targeting Pacific hake (*Merluccius productus*) with off-bottom trawls (Table 1). For each major area, data were arrayed in spreadsheet form, with the following column headings: species, sample number, major area, depth of bottom, depth of "gear" (headrope), specimen number, sex, and length (fork; cm). Height off the bottom of the headrope was obtained by subtraction—bottom depth – gear depth.

ON-BOTTOM TRAWLING

In the Queen Charlotte Sound-Hecate Strait Region, the R/V *G.B. Reed* was utilized in 1967, 1969-70, 1973-74, and 1978, and chartered domestic trawlers in 1968 and 1970-71 (Table 1). No observers were aboard the latter vessels, in 1970-71, and catches were sampled at the processing plant.

Off west Vancouver Island, during 1985 and 1988-89, chartered, domestic commercial trawlers, employed to conduct resource surveys, provided samples from on-bottom schools (Table 1).

---

[1] That portion of Area 5A lying north of Cape Scott. See Figure 1.

Echograms were routinely collected from each *G.B. Reed* trawl haul, and photographed. The echo-sounder used "wet paper", hence the need for photographs to provide permanent storage. All such photographs were not archived, but a sufficient number were found to provide examples of off-bottom schools. Examples of strong echoes are provided in this report. No echograms were found for other vessels.

TRAWLING GEAR

Modified on-bottom trawl (Off-1). Westrheim *et al.* (1968) provided the following description: 1400-lb oval doors; six floats on top of intermediate and codend; 2 bobbins on wire groundline; otherwise the same as the *G.B. Reed* bottom trawl (On-1, described below). The trawl doors maintained contact with the bottom, and the net was expected to float free. No tests were conducted as to its height off the bottom.

Universal Mark II trawl (Off-2). Harling *et al.* (1970) provided the following description:1400-lb BMV oval doors, 30-fm (55 m) sweeplines, 53-15 8" (40 cm) aluminum floats on the headrope, 5/8" (16 mm) chain on footrope, 1 1/2" (38 mm) mesh liner in the intermediate and codend. The trawl doors maintained contact with the bottom, but the net floated free. A brief examination by divers, in 1969, indicated that the net was 0-4 fms (0-7 m) off the bottom, in the test area (Juan de Fuca Strait; Area 4A) off the north Washington State coast, at 10 fms (18 m) (Harling *et al.* 1969).

Engel trawl (Off-3). Taylor (1969) provided the following description: Superkrub otter boards (five square meters) were attached to the net by 30-fm, bridles of 0.5" cable; the headline was fitted with 80 8" trawl floats; groundline was fitted with 296 lb of 1.25" chain on each lower wing corner; the anterior portion of the net was 1400 8-in (203-mm) meshes in circumference, and graded through a series of mesh sizes to 1.5-in (38-mm) mesh in the codend. Neither the trawl doors nor the net were in contact with the bottom.

Modified Engel trawl (Off-3M). Westrheim *et al.* 1973 provided the following description: "Shortened to 477 meshes in length by replacing the posterior most tapered panel, intermediate, and codend, with 356 meshes of 3" (8 mm) mesh, green, polypropylene web graduating posteriorly from Ulstron no. 1, 450-P to Ulstron no. 72. Overall mesh graduations posteriorly were 16", 8", 6-1/4", 4-3/4", and 3" (402-76 mm). No liner was installed". Neither the net nor trawl doors were in contact with the bottom.

Foreign trawl (Off-X). No description was found.

On-bottom trawls. Harling *et al.* (1970) described the *G.B. Reed* trawl (On-1) as follows: 1400-lb (635 kg) Brompton otterboards; 35-fm (64 m) sweeplines; 19" (48 cm) rubber bobbins on groundrope; "500-mesh eastern-type trawl; 1 1/2" (38 mm) mesh liner in the intermediate and codend. On-bottom trawls used by chartered, domestic vessels were generally similar. No description was found for those (On-X) used in Queen Charlotte Sound. Cruise reports contain descriptions of those (On-Xa,b) used off west Vancouver Island.

TRAWLING METHODS

Off-bottom trawling by the *G.B. Reed*, and chartered domestic vessels, was undertaken where off-bottom schools were detected by echo sounder. Foreign vessels operating in Areas 3D and 3C were ostensibly concerned with catching Pacific hake on a commercial basis. Pacific ocean perch was a minor by-catch. No records of their fishing strategies were found.

On-bottom trawling by the *G.B. Reed*, during 1967-78, was designed as a resource survey. Trawls were undertaken at the mid-point of each 20-fm interval, along pre-determined tracklines--90 fms for the 80-99 interval, *etc*. Chartered domestic vessels operating in Queen Charlotte Sound were only concerned with providing results for comparison with those of off-bottom trawls. Chartered domestic vessels operating in Areas 3D and 3C were only concerned with resource surveys. Strategies were reported in the appropriate cruise reports.

TRAWLING GROUNDS

Heavy glaciation during the Pleistocene period carved the bottom of Queen Charlotte Sound and Hecate Strait into a number of troughs and banks (Luternauer 1972), many of which were unnamed when the *G.B. Reed* 1972-73 trawl survey was undertaken (Westrheim 1974). The latter author introduced "more descriptive names". Among these (with Luternauer's in parentheses) were Goose Island Gully (South Trough), Mitchell's Gully (precedes Central Trough), and Moresby Gully (North Trough).

Goose Island Gully. Located in southern Queen Charlotte Sound (Areas 5An+5B; Fig. 2), with an estimated area of 993 sq nm (1,743 km^2)[2], over a depth range of 80-159 fms (146-291 m) (Gunderson *et al.*1977). An estimated 89% was deemed trawlable. Trawlability was deemed 0% beyond 159 fms, for the *G.B. Reed* on-bottom trawl.

Moresby Gully. Located in southern Hecate Strait (Area 5C) and northern Queen Charlotte Sound (Area 5B; Fig. 2). Estimated area was 2,239 sq nm (3,930 km^2) at 80-259 fms (146-474 m) (Westrheim 1974). An estimated 34% was deemed trawlable, for the *G.B. Reed* on-bottom trawl. The Area-5B portion was surveyed with echo sounder, but deemed untrawlable.

West Vancouver Island. Location of catches by foreign vessels was limited to area only—3D and 3Cn[3]. Records of domestic vessels were consolidated in the same manner, for comparative purposes.

---

[2] The original estimate of 1,147 sq nm in Westrheim (1972) was reduced by the recognition, in Westrheim (1974), of the S.W. Slope Goose Island Bank (295 sq nm at 80-199 fms) as separate from Goose Island Gully, on the basis of bottom terrain (4% trawlable), and prominent species (primarily *S. proriger*).

[3] Area 3Cn is that portion of Area 3C lying within the Canadian Extended Economic Zone (EEZ). Area 3Cs is that portion of Area 3C lying within the U.S. EEZ

CATCH PROCESSING

On the *G.B. Reed*, catch sampling procedure was the 6-tub method of Westrheim (1968). All fish in sample were measured to the nearest lower centimetre, fork length. Total weight and numbers caught were estimated by extrapolation. For other vessels, catch-processing procedures were not reported for some domestic vessels, all foreign vessels, or for sampling procedures at the domestic processing plants.

RECORDS

Appropriate records were obtained from published cruise reports, the Pacific Biological Station (PBS) Groundfish Data Base, and the PBS Scientific Archives. Prior to 1988, fathom was the depth measurement on fishing charts and echo sounders. Similarly, English measures were usual for mesh sizes of nets, and weights of catches. Metric equivalents have been provided where appropriate. Aboard the R/V *G.B. Reed*, Pacific ocean perch were measured to the nearest lower centimeter, and length-frequencies were grouped into 2-cm intervals (lower odd + upper even). The same procedure was followed for catches of chartered, domestic vessels operating in Queen Charlotte Sound. For the domestic, chartered trawlers, and foreign vessels, operating in Areas 3C and 3D, lengths were measured to the nearest centimeter. These measurements were also grouped into 2-cm intervals. Sex ratios were expressed as % males.

RESULTS

GENERAL

Length-frequency samples for this analysis were collected from off-bottom and on-bottom trawl catches in Goose Island and Moresby gullies, and off west Vancouver Island (Table 1). In Goose Island Gully, samples from off-bottom catches were collected during 1968 and 1970-71, and from on-bottom trawl catches during 1967, 1969, and 1970-71. In Moresby Gully, samples from off-bottom catches were collected in 1973, and from on-bottom trawl catches during 1973, 1974, and 1978. Off west Vancouver Island, samples of off-bottom trawl catches by foreign vessels were collected during June-August 1989 in Area 3D, and during May-September 1988-89 in Area 3C. Samples of comparable on-bottom trawl catches were collected from chartered, domestic commercial trawlers during 1985 and 1988-89.

A total of 10 echograms were selected which displayed prominent off-bottom fish schools. Echo table 1 contains an index, and Echo figures 1-5 contain photocopies of the individual echograms. Surprisingly, strong echoes were limited to two 20-fm depth intervals—90 and 110. Strong off-bottom echoes were recorded in Goose Island, Mitchell's, and Moresby gullies, and on the southwest slope of Goose Island Bank, all in the 90- and 110-fm depth intervals (Echo table 1). Interestingly, one haul on the southwest slope of Goose Island Bank, on very rough bottom, yielded a substantial catch of rockfish, but no Pacific ocean perch (Echo figure 4, Echo 7).

GOOSE ISLAND GULLY

Modified On-bottom (Off-1)

1967. In October at 140-159 fms (256-291 m), four trawl hauls were completed with the Off-1 net, and in September, six hauls with the On-1 net (Tables 2 and 3). Total catch of the Off-1 net was 5,620 lbs, of which Pacific ocean perch comprised 62% (3,454 lbs). Total catch of the On-1 net was 22,561 lbs, 75% (16,862 lbs) Pacific ocean perch. Length-frequencies, for each sex, exhibited little difference between net types (Fig. 3). Both were essentially uni-modal— 38 cm for males, and 40 cm for females. Mean lengths were significantly smaller in the Off-1 catches (35.7 *vs* 37.6 cm for males, and 38.6 *vs* 39.5 cm for females), based on a "t" test (Table 4). Sex ratio was also significantly smaller in the Off-1 catch (40% *vs* 58% males), based on a Chi-square test (Table 5).

Universal Mark II (Off-2)

1970. In June, 29 trawl hauls were attempted in the northwest sector of Goose Island Gully, primarily along the LORAN-A Line 4100N, in four 20-fm depth intervals, whose mid-points were 90, 110, 130, and 150 (Appendix table 1). Off-2 hauls totalled 13, of which 2 were unusable (doors off bottom; lost net on snag); 3 were on rough bottom, and yielded no Pacific ocean perch. On-1 hauls totalled 16, of which only one (on rough bottom) yielded virtually no Pacific ocean perch. Depth off the bottom of the Off-2 net was not reported. Among depth intervals, Off-2 catches ranged from 214 to 1,812 lbs, and proportions of Pacific ocean perch ranged from 27 to 94%. Comparable On-1 catches ranged from 5,077 to 12,464 lbs, and proportions of Pacific ocean perch, 6 to 80%.

Male and female length-frequencies in the Off-2 catches were uni-modal at the 90-fm interval, and bi-modal at the 110-, 130-, and 150-fm intervals (Figs. 4a,b,c,d; Table 6). On-1 distributions were uni-modal at 90 fms, and bi- or multi-modal at 110, 130, and 150 fms. For both sexes, Off-2 *vs* On-1 comparisons of mean lengths indicated that Off-2 fish were significantly smaller at 90 fms; significantly greater at 110 fms; and not significantly different at 130 and 150 fms (Table 4). The Off-2 net likely sampled mostly the on-bottom fish, but showed some promise as a "rough-bottom" trawl. Sex ratios between net types were not significantly different at 90, 110, and150 fms, and significantly smaller in the Off-2 catches at 130 fms (Table 5).

Engel (Off-3)

1968. In August, 31 Off-3 trawl hauls were undertaken with the F/V *Royal Canadian* (Harling 1968), of which 25 occurred in Goose Island Gully (Appendix table 3). No on-bottom trawl hauls were undertaken. Results were mixed. No Pacific ocean perch were caught in the two hauls at 60-79 fm depth interval, four of the 14 hauls at 80-99 fms, five of the six hauls at 100-119 fms, and only 2 lbs in the single haul at 140-159 fms. Gear failures accounted for the other two hauls. Principal "other" species was

Pacific hake, most of whose catches were in excess of 2,000 lbs. Principal sectors for Pacific ocean perch were northeast (NE) and southeast (SE), at 90 fms. These will be the subject of subsequent analyses. On-bottom trawl hauls, of the R/V *G.B. Reed*, from 1967 (On-1a) and 1969 (On-1b) were used at comparable depths for comparisons.

Total catch of the Off-3 net was 25,686 lbs, of which 23% (5,980 lbs) was Pacific ocean perch (Table 7). Incidence of Pacific ocean perch ranged, among hauls, from 0.2 to 95% (Appendix table 4). Total catch of the On-1a net was 10,212 lbs, 42% (17-76%; 4,244 lbs) Pacific ocean perch, and for the On-1b net, 15,742 lbs, 58% (19-79%; 9,120 lbs) Pacific ocean perch (Appendix tables 5 and 6).

Male length-frequencies were uni-modal, in the Off-3 catch (40 cm), and multi-modal in On-1a and On-1b catches (Fig. 5; Table 7). Principal modes[4] for On-1a fish were 28, 20, and 34 cm, and for On-1b, 32 and 26 cm. Mean length of Off-3 fish (40.0 cm) was significantly greater than those for On-1a (27.0 cm) or On-1b (30.0 cm) fish (Table 4). Female length-frequencies were also uni-modal for Off-3 fish (44 cm), and essentially so for On-1a (26 cm) and On-1b (32 cm). Mean length of female Off-3 fish (42.5 cm) was significantly larger than those for On-1a (28.8 cm) or On-1b (30.9 cm) fish. Sex ratio was significantly smaller in the Off-3 catch (40%) than for On-1a (51%) or On-1b (50%) (Table 5).

1970. During June-July, two chartered, domestic commercial trawlers conducted comparison hauls in Goose Island Gully—the F/V *Canadian No. 1* with the Off-3 trawl, and the F/V *Royal Canadian* with an on-bottom (On-X) trawl. A total of 31 Off-3 trawl hauls were completed, at 80-116 fms (146-212 m)--28 in the northeast (NE) sector, 1 in the southeast (SE) sector, and 2 in the northwest (NW) sector (Appendix table 7). Total landed catch was 143,219 lbs, of which 59% was Pacific ocean perch (84,675 lbs). Proportions of Pacific ocean perch, among hauls, ranged from 52 to 100 %. On-X trawl hauls totalled 34, at 87-120 fms (159-220 m), of which 17 were in the northeast sector, 8 in the southeast sector, and 9 in the northwest sector. Total catch was 129,417 lbs, of which 80% (103,520 lbs) consisted of Pacific ocean perch. Proportions of Pacific ocean perch, among records, ranged from 57 to 100%. During June, the R/V *G.B. Reed* completed four on-bottom (On-1) trawl hauls in the northeast sector, and two in the southeast sector (Appendix table 8). Total catch was 17,010 lbs, of which 67% (11,375 lbs) was Pacific ocean perch. Among-haul proportions ranged from 30 to 95%.

Length-frequencies for both sexes were uni-modal in Off-3 catches, and multi-modal in On-X and On-1 catches (Fig. 6; Table 8). Male Off-3 mode was 40 cm. Principal modes for On-X fish were 40, 32, and 28 cm, and for On-1 fish, 28 and 40 cm. Mean length of Off-3 fish (38.5 cm) was significantly larger than those of On-X (34.6 cm) or On-1 (32.7 cm) fish (Table 4). Female Off-3 mode was 42-44 cm, compared to 40 cm and 28-30 cm for On-X, and 30 cm and 44 cm for On-1. Mean length of Off-3 fish (41.4 cm) was significantly larger than those of On-X (36.4 cm) or On-1 (34.6 cm) fish. Sex ratio was significantly smaller in the Off-3 catch (43% males), than in the On-1 catch (54%), but not so for the On-X catch (48%) (Table 5).

---

[4] Modes are reported in descending importance, relative to the numbers of fish involved.

Replicate samples of the landed catch from the Off-3 net were collected at the processing plant, and labelled Bin #1 and Bin #2. Both distributions were essentially uni-modal. Principal modal lengths were the same for males (40 cm), but different for females—44 cm in Bin #1, and 42 cm in Bin #2 (Table 8). Male mean length was significantly smaller in Bin #1 (37.6 cm) than in Bin #2 (39.4 cm), but female mean lengths were identical (41.4 cm) (Table 4). Sex ratio was greater in Bin #1 (43%) than in Bin#2 (42%), but not significantly so (Table 5). The primary difference between samples appears to be the absence of small males (<36 cm) in Bin # 2 sample.

1971. During June-July, the F/V *Royal* Canadian conducted comparison hauls in Goose Island Gully, with off-bottom (Off-3) and on-bottom (On-X) trawls. A total of 13 Off-3 trawl hauls were completed, at 65-101 fms (119-185 m), all in the northeast sector (Appendix table 7). Total catch was 39,394 lbs, all Pacific ocean perch. On-X trawl hauls totalled 16, at 80-126 fms (146-231 m)--five in the southeast sector, eight in the northeast sector, and three in the northwest sector. Total catch was 104,011 lbs, of which 70% (72,545 lbs) consisted of Pacific ocean perch. Proportions ranged, among hauls, from 56 to 100%.

Length-frequencies, for both sexes, were uni-modal in the Off-3 landings, and bi-modal for the On-X landings (Fig. 7; Table 9). The male Off-3 mode was at 40 cm, and the On-X modes were at 34 cm and 40 cm. Mean lengths were significantly larger for the Off-3 fish--40.1 cm *vs* 34.6 cm (Table 4). The female Off-3 mode was at 42 cm, and the On-X modes at 34 cm and 44 cm. Mean length of the Off-3 fish was significantly larger—41.6 cm vs 37.5 cm. Sex ratio was significantly smaller for the Off-3 fish—41% *vs* 53% (Table 5).

MITCHELL'S GULLY

No comparison hauls were conducted, but one echogram (Echo fig. 4; no. 12), in the 110-fm depth interval, is included here to demonstrate that off-bottom fish schools are not limited to Goose Island and Moresby gullies.

MORESBY GULLY

Modified Engel Trawl (Off-3M)

In July 1973, the Off-3M and On-1 trawl catches of the R/V *G.B. Reed*, in the 90-fm depth interval, were compared (Fig. 8; Table 10). Five Off-3M trawl hauls were successfully completed[5] over a bottom-depth range of 83-94 fms, but only one haul, at 92-88 fms (168-161 m), yielded appreciable quantities of fish. Total catch was 542 lbs, of which 92% (497 lbs) was Pacific ocean perch. The single comparable on-bottom (On-1a) trawl haul (90-91 fms; 165-167 m), yielded 12,783 lbs, of which 37% (4,763 lbs) was Pacific ocean perch. Two comparable on-bottom trawl hauls each were completed by the

[5] The authors reported that despite the abundant supply of fish schools, catches were relatively small. Important factors were adverse currents and unsatisfactory LORAN reception (Westrheim *et al.* 1973).

R/V *G.B. Reed* in September 1974 (On-1b) and 1978 (On-1c). In 1974, total catch was 6,284 lbs, of which 12% (753 lbs) was Pacific ocean perch. In 1978, total catch was 4,377 lbs, of which 21% (909 lbs) was Pacific ocean perch.

Length-frequencies, for both sexes, were uni-modal in Off-3M catches, and at least bi-modal in On-1a,b,c catches (Fig. 8; Table 10). The male Off-3M mode was at 42 cm. On-1a (1973) modes were at 42 and 28 cm; On-1b (1974) modes were at 24, 28, and 42 cm; and On-1c modes were at 34, 24, and 42 cm. Female Off-3 mode was at 44 cm. On-1a modes were at 44, 30, and 38 cm; On-1b modes were at 24, 28, and 46 cm; and On-1c modes were at 32, 46, and 26 cm.

Male Off-3M mean length (41.1 cm) was significantly larger than those for On-1a (37.6 cm), On-1b (29.5 cm), or On-1c (32.5 cm) fish (Table 4). Female mean length of Off-3M fish (42.5 cm) was also significantly larger than those for On-1a (37.1 cm), On-1b (30.7 cm), or On-1c (33.9 cm) fish.

Sex ratios were significantly smaller in Off-3M catches (52%) than in On-1a catches (63%), but not significantly different from those in On-1b (52%) or On-1c (53%) catches (Table 5).

AREA 3D

During June-August 1989, records of Pacific ocean perch catches, and length-frequencies were collected by observers aboard foreign vessels ostensibly targeting Pacific hake with off-bottom (Off-X) trawls (Appendix table 10). Thirteen samples (presumably hauls) provided useful information. Records of three other hauls were rejected, because the length-frequencies indicated other species were also included (excessive size of the fish). Seven 40-m depth intervals were fished—260-500 m. Height of the headrope above bottom ranged from 55 m (30 fms) to 280 m (153 fms), but only two (55 and 70 m) were less than 100 m (55 fms). Comparable records of on-bottom (On-Xa) trawling were provided by the chartered, domestic commercial vessel F/V *Ocean Selector*, operating during July 1989. Three 40-m depth intervals were fished--220, 260, and 300 m (120, 142, and 164 fms) (Table 11).

Off-X

Total catch of the 13 Off-X trawl hauls was 227 t (501,000 lbs), of which Pacific ocean perch comprised 32% (73 t; 160,000 lbs) (Table 11). Among depths, catches ranged from 4 to 77 t (9,500-170,000 lbs), and proportions of Pacific ocean perch, 2-67% (660-57,000 lbs). Three anomalously large catches of Pacific ocean perch were reported, from Haul nos. 67306 (13.5 t at 335 m; 183 fms), 66970 (21.6 t at 380 m; 208 fms), and 67000 (18.8 t at 450 m; 246 fms) (Appendix table 10). These results provide further evidence of substantial off-bottom schools of Pacific ocean perch.

Length-frequencies were roughly similar in shape among depths and sexes (Fig. 9). Male distributions were uni-modal in three, and bi-modal in four, of the seven depth

intervals (Table 11). The principal modes, among all depth intervals, occurred at 34, 36, or 38 cm. Mean lengths regressed on depth were poorly correlated (r = 0.109), but slope (-0.001) was not significantly different from zero (Table 12). Female distributions were also uni-modal in four, and bi-modal in three, of the seven depth intervals. Principal modes, among all depth intervals, were 38 and 40 cm. Mean depths regressed on depth were poorly correlated (r = 0.230), but slope (-0.002) was not significantly different from zero.

Graphing mean lengths on depth yielded undulating patterns for both sexes (Fig. 10). Interestingly, similar patterns were noted, in a previous report (Westrheim and Stanley, in review), for the relationships of mean lengths of selected age groups on depth, in *on-bottom* trawl catches elsewhere. These were from domestic, commercial trawlers operating, during 1980-99, in MSA 1W (Area 5E), Moresby Gully, and Goose Island Gully (their Figs. 4-9). The explanation of these phenomena is not readily apparent, but stock delineation is a possibility.

In the three 40-m depths in which the aforementioned anomalously large catches of Pacific ocean perch occurred, one or two other length-frequency samples were collected. The question arises whether the mean lengths of the latter samples differed from those from the anomalous catches. Statistical tests yielded mixed results. In the 340-m depth interval, two samples were collected, and the mean lengths, for both sexes, were significantly larger in the samples from the anomalously large catches, based on "t" tests—39.2 *vs* 37.0 for males, and 41.2 *vs* 39.2 cm for females (Table 13). Three samples were involved in the 380- and 460-m depth intervals. ANOVA results indicated no significant difference between the three samples, for either sex. At 380 m, mean lengths in anomalous catches were intermediate for males, and smallest for females. At 460 m, mean lengths in anomalous catches were smallest for both sexes.

On-Xa

Length-frequencies were more complex than those in Off-X catches (Fig. 11). Male length-frequencies were essentially uni-modal at 220 m (120 fms) and 300 m (164 fms), and bi-modal at 260 m (142 fms) (Table 14). Modes were at 38 cm for 220 m, at 42 and 24 cm for 260 m, and at 36 cm for 300 m. The three mean lengths (37.0, 33.3, and 36.6 cm) were not regressed on depth. The apparent "undulation" appeared to be caused by disparate distributions from the two trawl hauls at 260 m which produced a bi-modal distribution for the total sample. Haul 13 (247 m; 136 fms) distribution was uni-modal at 24 cm, and Haul 15 (256 m; 140 fms), uni-modal at 42 cm. Female length-frequencies exhibited similar patterns. Distributions were bi-modal at 220 m, multi-modal at 260 m, and uni-modal at 300 m. Mean lengths were 41.8, 31.5, and 38.0 cm, respectively. Haul 13 distribution was bi-modal, at 24 and 32 cm, and Haul 15 distribution was bi-modal at 38 and 42 cm.

Off-X *vs* On-Xa

Comparisons of length-frequencies were limited to two 40-m depth intervals--260 and 300.

Male length-frequencies of Off-X fish were bi-modal at both depths, and for On-Xa fish, bi-modal at 260 m, and uni-modal at 300 m (Figs. 12a,b). Mean lengths were not significantly different at either depth—37.5 vs 37.0; 40.6 vs 41.8 cm (Table 4). Female length-frequencies of Off-X fish were bi-modal at both depths, and for On-Xa fish, multi-modal at 260 m and uni-modal at 300 m. Mean lengths of Off-X fish were significantly smaller at 260 m (40.6 vs 41.8 cm), but significantly larger at 300 cm (41.4 vs 38.0 cm)..

Sex ratios were significantly smaller for Off-X fish at both depths—19% *vs* 35% at 260 m, and 31% *vs* 44% at 300 m (Table 5).

AREA 3C

During May-September 1988-89, records of Pacific ocean perch were collected by observers aboard foreign vessels ostensibly targeting Pacific hake, in Area 3Cn, with off-bottom (Off-X) trawls (Appendix table 12, 13 and 14). Seventeen samples (presumably individual trawl hauls) were available (Table 15). The nine 40-m depth intervals fished were 140 and 220-500. Height of the headrope above bottom ranged from 10 m (5 fms) to 290 m (158 fms), but only two were less than 120 m (66 fms). Comparable records of on-bottom trawling were provided by two chartered, domestic commercial vessels, operating in Area 3Cn during July 1989 (F/V *Ocean Selector*; On-Xa), and in Area 3C (3Cn+3Cs) during September 1985 (F/V *Howe Bay*; On-Xb). The three 40-m depth intervals fished with the On-Xa net were 180, 220, and 300 m (98, 125, and 155 fms) (Table 16). The five 40-m depth intervals fished with the On-Xb net were 220-380 (120-208 fms) (Table 17).

Off-X

The 17 Off-X trawl hauls produced a total catch of 326 t (719,000 lbs), of which Pacific ocean perch comprised 20% (66 t; 145,000 lbs) (Table 15). Among depths, total catches ranged from 11 to 104 t (23,400-230,000 lbs), and proportions of Pacific ocean perch, 6-69% (3,100-45,000 lbs). Three anomalously large catches of Pacific ocean perch were reported—Haul nos. 66896 (17 t at 300 m; 164 fms), 66924 (12 t at 400 m; 219 fms), and 66890 (17 t at 450 m; 246 fms) (Appendix table 12). These results provide further evidence of substantial off-bottom schools of Pacific ocean perch.

Length-frequencies exhibited no clear pattern among depths, for either sex (Fig. 13). Male distributions were uni-modal in four, and bi-modal in five, of the nine depth intervals (Table 15). The principal modes ranged from 32 to 40 cm. Mean lengths regressed on depth were well correlated ($r = 0.764$), and slope (0.017) was significantly different from zero (Table 12). Female distributions were also uni-modal in four, and bi-modal in five, of the nine depth intervals. Principal modes ranged from 36 to 44 cm. Mean lengths regressed on depth were well correlated ($r = 0.774$), and slope (0.016) was significantly different from zero

The graph of mean length on depth, for both sexes, yielded an undulating pattern (Fig. 14), similar to that for Off-X in Area 3D (Fig. 10).

As with Area 3D, three anomalously large catches of Pacific ocean perch occurred, and one or two other length-frequency samples were collected in each case. Statistical tests of the two types of length-frequencies indicated no significant differences. At the 460-m depth interval (2 samples), mean lengths in the anomalous catches were smaller for both sexes, but not significantly so, based on "t" tests (Table 13). At the 300-m (3 samples) and 420-m (5 samples) depth intervals, mean depths were not significantly different among samples, based on ANOVA. Mean lengths from anomalous catches were intermediate in all examples, except for females, at 300 m, where they were smallest.

On-Xa

Length-frequencies exhibited differing patterns among depths and sexes (Fig. 15). Male length-frequencies were bi-modal at 180 m (28 and 38 cm); and uni-modal at 220 (34 cm) and 300 m (36 cm) (Table16). Respective mean lengths were 32.7, 33.2, and 35.7 cm. Female length-frequencies exhibited a similar pattern. Length-frequencies were multi-modal at 180 m (38, 44, 34, and 26 cm), tri-modal at 220 m (34, 40, and 26 cm), and uni-modal at 300 m (36 cm). Respective mean lengths were 36.7, 35.4, and 37.0 cm. At the 180-m interval, the two length frequencies, for each sex, exhibited contrasting distributions. Haul 20's modes were at 28 cm for males and 26 cm for females, while corresponding modes for Haul 21 were 38 and 38 cm. No regression analysis was deemed appropriate for either sex.

On-Xb

Length-frequencies in On-Xb catches exhibited similar patterns among depths and sexes (Fig. 16). Male length-frequencies were essentially uni-modal at all depths, with modes at 38 or 40 cm (Table 17). Slope (-0.013) differed significantly from zero, but correlation (0.926) was significant ($R^2 = 0.858$) (Table 12). Female length-frequencies were bi-modal at 220, 260, and 300 cm (42 and 32, 34, or 36 cm), and uni-modal at 340 (42 cm) and 380 m (40 cm). Slope (-0.014) was significantly different from zero, but correlation (0.708) was marginally significant ($R^2 = 0.501$).

Mean lengths regressed on depth, for both sexes, yielded a modest undulating pattern, with an evident downward trend (Fig. 17), a pattern noted for mean-length-at-age vs depth for on-bottom catches in Moresby Gully (Westrheim and Stanley 2006, Figs. 6 and 7).

Off-bottom *vs* On-bottom

Comparisons of mean lengths and sex ratios between off-bottom and on-bottom catches were possible for five 40-m depth intervals—220, 260, 300, 340, and 380 m.

Male length-frequencies in Off-X catches were uni-modal at three (260, 300, and 340 m) of their five depth intervals, and bi-modal at two (220 and 380 m) (Table 15, Figs. 18a,b,c,d,e). On-Xa distributions were uni-modal at both of their two depth intervals--220 and 300 m (Table 16). On-Xb distributions were uni-modal at three of their five depth intervals (220, 340, and 380 m), and bi-modal at two (260 and 300 m) (Table 17). Mean lengths of Off-X fish in the two Off-X *vs* On-Xa comparison were significantly larger at 300 m, but not significantly different at 220 m (Table 4). In the five Off-X *vs* On-Xb comparisons, Off-X fish were significantly smaller at 220 m and 260 m; larger at 340 m; and not significantly different at 300 and 380 m.

Female length-frequencies in Off-X catches were uni-modal at 220, 260, 300, and 380 m, and bi-modal at 340 m (Table 15). On-Xa distributions were uni-modal at both depths (220 and 300 m), while On-Xb distributions were uni-modal at 340 and 380 m, and bi-modal at 220, 260, and 300 m (Tables 16 and 17). In the comparison of Off-X and On-Xa, Off-X mean lengths were significantly larger at 220 and 300 m (Table 4). In the ()ff-X *vs* On-Xb comparisons, Off-X mean lengths were significantly smaller at 220 and 260 m; significantly larger at 300 and 340 m; and not significantly different at 380 m.

Sex ratios were significantly smaller for Off-X fish in all comparisons with On-Xa and On-Xb fish, except at 380 m, for Off-X fish (Table 5). There, Off-X sex ratio (27% males) was also smaller than that of On-Xb (29%), but not significantly so.

SUMMARY AND DISCUSSION

The purpose of this study was to compare the size compositions and sex ratios of Pacific ocean perch in off-bottom and on-bottom trawl catches from Queen Charlotte Sound, southern Hecate Strait, and off the west coast of Vancouver Island. Table 18 summarizes the results.

In the Queen Charlotte Sound-Hecate Strait Region, three types of off-bottom trawls (modified on-bottom, Universal Mark II, and Engel) were employed whose catches were compared with those of conventional on-bottom trawls. Vessels involved were the R/V *G.B. Reed* and chartered, domestic, commercial trawlers. Photocopies of ten echograms from the *G.B. Reed* sounder were presented as exampies of off-bottom fish schools encountered in Goose Island, Mitchell's, and Moresby gullies. No echogram records were found for the chartered vessels.

In the West Vancouver Island Region, conventional off-bottom trawls were employed by foreign vessels, ostensibly targeting Pacific hake. Their catches were recorded, and sampled, by Canadian observers stationed aboard the vessels. The comparable on-bottom trawling was undertaken by chartered, domestic, commercial trawlers. No echograms were found for foreign or domestic vessels.

Principal results in the Queen Charlotte Sound-Hecate Strait Region were; (1) only the Engel trawls (modified and unmodified) satisfactorily sampled off-bottom fish schools; (2) off-bottom fish schools consisted of Pacific ocean perch, other rockfish, Pacific hake, or Pacific pollock; (3) large catches of other rockfish were limited to rough bottom, where few if any Pacific ocean perch were caught, and the most common species was *S. proriger* (redstripe rockfish); (4) size compositions of Pacific ocean perch in Engel-trawl catches were consistently uni-modal, in contrast to bi-modal or multi-modal in on-bottom trawl catches; (5) mean lengths of Pacific ocean perch in Engel-trawl catches were significantly larger than those in comparable on-bottom trawl catches; (6) sex ratios were smaller (fewer males), and usually significantly so, than those in comparable on-bottom trawl catches; (7) the general absence of small (young) fish in the Engel-trawl catches is unexplained at this time; (8) a replicate test of landings sampling (of Engel-trawl catches) was positive, except for a mild perturbation in the size distribution of males; and (9) no strong off-bottom echoes of fish schools were found at bottom depths beyond the 100-119 fm (183-218 m) depth interval.

Principal results in the West Vancouver Island Region are: (1) size compositions of Pacific ocean perch caught in off-bottom and on-bottom trawl catches were uni-modal or bi-modal, but without a consistent pattern, by sex or depth interval; (2) similarly, mean lengths also exhibited no consistent pattern for either sex; (3) the undulating relationship of mean length to depth is analogous to a similar relationship of age-group mean length to depth in on-bottom trawl catches in the Queen Charlotte Sound-Hecate Strait Region reported in the preceding manuscript of this series; (4) sex ratios were consistently, and usually significantly, smaller (fewer males), with one exception, in the off-bottom trawl catches, than in the on-bottom catches; (4) perhaps the most surprising results were the occasional substantial off-bottom trawl catches of adult Pacific ocean perch over depths of up to 460 m (251 fms), where the headrope was 105-270 m (57-148 fms) off the bottom.

Sex ratios were computed from the entire length-frequency samples. However, even when the length frequencies were reduced to only those lengths common to both pairs, there was little change in significance. That is, the significance of the Chi-square values did not change.

ACKNOWLEDGEMENTS

The authors are grateful for the critical, and constructive, reviews by G.E. Gillespie, and Drs. D.R. Gunderson and A. Sinclair. The manuscript was improved by their efforts. We also thank F.G. Miller, K.L. Rutherford, N. Olsen, B. Agar and L. MacDougall for their technical support.

REFERENCES

Dixon, W.J., and Massey, F.J., Jr., 1969. Introduction to Statistical Analysis. McGraw-Hill Book Co. New York, San Francisco. 638 p. (Third Edition)

Gillespie, G.E., and Leaman, B.M. 1990. Rockfish sampling cruise: F/V *Ocean Selector*, July 12 to 30, 1989. Can. Manuscr. Rep. Fish. Aquat. Sci. 2061: 89 p.

Gunderson, D.R., Westrheim, S.J., Demory, R.L., and Fraidenburg, M.E. 1977. The status of Pacific ocean perch (*Sebastes alutus*) stocks off British Columbia, Washington, and Oregon, in 1974. Tech. Rep. Fish. Mar. Serv. (Can.). 690: 63 p.

Harling, W.R. 1968. *Royal Canadian* midwater trawl cruise no. 68-3, August 13-29, 1968, August 13-29, 1968. Manuscr. Rep. Fish Res. Board Can. 996. 20 p.

Harling, W.R., Davenport, D., Smith, M.S., Kristiansen, U., and Westrheim, S.J. 1970. *G.B. Reed* groundfish cruise no. 70-1, March 5-June 18 1970. Tech. Rep. Fish. Res. Board Can. 205. 82 p.

Harling, W.R., Davenport, D., Smith, M., and Wilson, R.M. 1969. *G.B. Reed* groundfish cruise no. 69-3, September 8 to 25, 1969. Tech. Rep. Fish. Res. Board Can. 144. 35 p.

Harling, W.R., Davenport, D., Smith, M.S., Phillips, A.C., and Westrheim, S.J. 1973. *G.B. Reed* groundfish cruise no. 73-2, September 5-25, 1973. Tech. Rep. Fish. Res. Board Can. 424. 37 p.

Harling, W.R., Shaw, W., Wallis, R.M., and Mottl, F.W. 1979. *G.B. Reed* groundfish cruise no. 78-7, August 29-September 19, 1978. Data Rep. Fish. Mar. Serv. (Can.) 120: 64 p.

Leaman, B.M., Gillespie, G.E., Nagtegaal, D.A., and Stanley, R.D. 1988. Biomass survey of rockfish stocks off the southwest coast of Vancouver Island, September 7-23, 1985 (F/V *Howe Bay*). Can. Tech Rep. Fish. Aquat. Sci. 1611: 99 p.

Luternauer, J.L. 1972. Patterns of sedimentation in Queen Charlotte Sound, British Columbia. Univ. British Columbia Ph.D. Thesis. 203 p.

Smith, M.S., Davenport, D., Harling, W.R., and Westrheim, S.J. 1972. Size and age compositions of Pacific ocean perch (*Sebastes alutus*) in British Columbia trawl landings, 1960-71. Manuscr. Rep. Fish. Res. Board Can. 1199. 43 p.

Snedecor, G.W. 1946. Statistical Methods. The Iowa State College Press, Ames, Iowa. 485 p. (Fourth Edition)

Taylor, F.H.C. 1969. The British Columbia offshore herring survey, 1968-69. Tech. Rep. Fish. Res. Board Can. 140. 54 p.

Westrheim, S.J. 1968. Sampling research trawl catches at sea. J. Fish. Res. Board Can. 24: 1187-1202.

Westrheim, S.J. 1970. Survey of rockfishes, especially Pacific ocean perch, in the northeast Pacific Ocean. 1963-66. J. Fish. Res. Board Can. 27: 1781-1809.

Westrheim, S.J. 1972. Explorations of rockfish grounds off British Columbia in 1971. Manuscr. Rep. Fish. Res. Board Can. 1200. 29 p.

Westrheim, S.J. 1974. Echo-sounder and trawl survey of Queen Charlotte Sound and southern Hecate Strait, 1972-73. Manuscr. Rep. Fish. Res. Board Can. 1307. 43 p.

Westrheim, S.J., Harling, W.R., and Davenport, D. 1968. *G.B. Reed* groundfish cruise no. 67-2, September 6 to October 4, 1967. Tech. Rep. Fish. Res. Board Can. 46. 45 p.

Westrheim, S.J., Harling, W.R., Davenport, D., and Smith, M.S. 1973. *G.B. Reed* groundfish cruise no. 73-1, June 5-July 16, 1973. Tech. Rep. Fish. Res. Board Can. 410. 51 p

Westrheim, S.J., Harling, W.R., Davenport, D., and Smith, M.S. 1974. *G.B. Reed* groundfish cruise no. 74-4, September 4-25, 1974. (Data Record). Tech. Rep. Fish. Mar. Ser. (Can.) 497. 37 p.

Westrheim, S.J., and Stanley, R.D. 2006. Bathymetric distributions of Pacific ocean perch (*Sebastes alutus*) off British Columbia. I. Mean length-at-age *versus* depth for specimens caught by on-bottom trawl off northwest Queen Charlotte Islands and in Hecate Strait and Queen Charlotte Sound. Manuscr. Rep. Can. Dep. Fish. Oceans. 2764: 78 p.

Table 1. Sources of information on off- and on-bottom trawl catches (or landings), by year, month, vessel, location, and net type, off British Columbia, May-October 1967-89.

Year	Month	Vessel[a]	Location[b]	Net[c]	Source
1967	Oct	GBR	GIG	Off-1	Westrheim *et al.* (1968)
	Sep	GBR	GIG	On-1	
1968	Aug	CC	GIG	Off-3	Harling (1968)
1969	Sep	GBR	JdFS	Off-2	Harling *et al.* (1969)
			GIG	On-1	
1970	Jun	GBR	GIG	Off-2/On-1	Harling *et al.* (1970)
	Jul	CC	GIG	Off-3/On-X	Smith *et al.* (1972)
1971	Jul	CC	GIG	Off-3/On-X	Smith *et al.* (1972)
1973	Jul	GBR	MoG	Off-3M/On-1	Westrheim *et al.* (1973)
	Sep	GBR	GIG/MiG	On-1a	Harling *et al.* (1973)
1974	Sep	GBR	MoG	On-1b	Westrheim *et al.* (1974)
1978	Aug-Sep	GBR	MoG	On-1c	Harling *et al.* (1979)
1989	Jun-Aug	Foreign	3D	Off-X	PBS Groundfish Data Base (GFBio)
1989	Jul	CC	3D & 3Cn	On-Xa	Gillespie and Leaman (1990)
1988-89	May-Sep	Foreign	3Cn	Off-X	PBS Groundfish Data Base (GFBio)
1985	Sep	CC	3Cn+3Cs	On-Xb	Leaman *et al.* (1988)

[a] Vessel: CC = chartered domestic commercial vessel; GBR = R/V *G.B. Reed.*
[b] Location: GIG = Goose Island Gully (5An+5B); JdFS = Juan de Fuca Strait (4A); MoG = Moresby Gully (5C); 3Cn = Canadian portion of Area 3C; 3Cs = U.S. portion of Area 3C.
[c] Net type: Off-1 = off-bottom (modified on-bottom trawl); Off-2 = off-bottom (Universal Mark II); Off-3 = off-bottom (Engel); Off-3M (modified Engel); Off-X = off-bottom (undescribed); On-1 = on-bottom (R/V *G.B. Reed*); On-X = on-bottom (undescribed); On-Xa = on-bottom (M/V *Ocean Selector*), On-Xb = on-bottom (M/V *Howe Bay*).

Table 2. Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-1) trawl, at the 140-159 fm depth interval in Goose Island Gully, October 1967. (Source: Westrheim *et al.* 1968)

Fork length (cm)	46		47		48		49		Total M		Total F	
	M	F	M	F	M	F	M	F	N	%	N	%
20	...	...	...	...	1	...	...	...	1	0.3		
22	1	...	...	3	0	...	1	...	2	0.5	3	0.5
24	1	1	2	2	5	1	0	1	8	2.2	5	0.9
26	3	0	5	6	3	0	1	0	12	3.2	6	1.1
28	0	0	1	1	3	2	0	1	4	1.1	4	0.7
30	0	0	4	2	5	3	0	4	9	2.4	9	1.6
32	0	0	10	8	13	3	3	5	26	7.0	16	2.9
34	1	0	26	22	19	17	17	8	63	17.0	47	8.5
36	4	1	29	24	29	20	24	18	86	23.2	63	11.4
38	3	3	28	37	22	29	45	36	98	26.5	105	19.0
40	2	3	11	49	18	43	24	35	55	14.9	130	23.6
42	...	3	1	36	1	37	4	36	6	1.6	112	20.3
44	...	...	...	11	...	18	...	17	...	...	46	8.3
46	...	...	...	...	...	5	...	1	...	...	6	1.1
Total	15	11	117	201	119	178	119	162	370	100.0	552	100.0
Mean (cm)									35.7		38.6	
S.D. (cm)									3.9		4.1	
% M	57.7		36.8		40.1		42.3		40.1			
Depth (fms)	154-152		154-143		154		152-153				140-159	
(m)	282-262		282-278		282		278-280				256-291	
Catch:												
Total (lbs)	85		1918		1293		2324				5620	
POP (lbs)	37		1634		1052		1484				3454	
% POP	43.5		85.2		81.4		63.9				61.5	

Table 3. Length-frequencies (nos.), by haul, and selected statistics for male and female Pacific ocean perch caught by the R/V *G.B. Reed* on-bottom (On-1) trawl, at 140-159 fms in Goose Island Gully, September 1967. (Source: Westrheim *et al.* 1968)

Fork length (cm)		17		21		25		26		29		30		Total M		Total F	
		M	F	M	F	M	F	M	F	M	F	M	F	N	%	N	%
18		...	...	...	...	...	...	1	...	...	...	...	...	1	0.1	...	...
20		...	...	...	...	...	...	1	...	...	...	...	...	1	0.1	...	...
22		...	1	4	3	2	1	2	3	...	...	1	...	9	0.9	8	1.1
24		1	0	5	6	0	0	3	1	...	...	3	1	12	1.2	8	1.1
26		2	2	6	6	1	0	0	2	...	...	1	0	10	1.0	10	1.3
28		4	1	1	6	0	0	0	4	1	...	0	1	6	0.6	12	1.6
30		2	1	10	2	0	0	2	0	1	...	0	0	15	1.5	3	0.4
32		6	0	12	2	0	0	0	2	2	2	4	2	24	2.4	8	1.1
34		5	1	29	8	6	1	3	6	9	4	4	1	56	5.5	21	2.8
36		7	7	51	19	36	2	30	16	36	9	29	5	189	18.5	58	7.7
38		28	10	55	24	60	18	58	19	78	30	63	14	342	33.5	115	15.3
40		41	27	30	25	28	58	55	45	38	38	57	25	249	24.4	218	29.1
42		42	45	4	20	6	41	11	22	8	31	15	25	86	8.4	184	24.5
44		15	32	...	9	1	9	2	9	...	7	1	13	19	1.9	79	10.5
46		2	18	...	...	...	...	...	1	...	...	...	4	2	0.2	23	3.1
48		...	3	...	...	...	...	...	...	...	...	...	...	...	...	3	0.4
Total		155	148	207	130	140	130	168	130	173	121	178	91	1021	100.0	750	100.0
Mean	(cm)													37.6		39.5	
S.D.	(cm)													3.7		4.3	
%M		51		61		52		56		59		66		57.7			
Depth	(fms)	152-154		154		150-151		138-150		154-155		154-150				140-159	
	(m)	278-282		282		275-276		253-275		282-284		282-275				256-291	
Catch:																	
Total	(lbs)	4551		2880		3724		1897		6052		3457				22561	
POP	(lbs)	3454		1706		3059		1366		5428		1849				16862	
% POP		75.9		59.2		82.1		72.0		89.7		53.5				74.7	

Table 4. T tests[a] of mean lengths from off- and on-bottom trawl catches, by year, location, and depth, for male and female Pacific ocean perch caught off British Columbia, 1967-89. (Sources: Tables 2, 3, 6-11, and 14-17)

Year	Loc.[b]	Depth[c] (fms)	(m)	Sex	Net[d]	N	Mean (cm)	S.D. (cm)	Sp	t	Df	P
1967	GIG	150	275	M	Off-1	370	35.7	3.9	3.754	-8.340	1389	<0.01
					On-1	1021	37.6	3.7				
				F	Off-1	552	38.6	4.1	4.216	-3.806	1300	<0.01
					On-1	750	39.5	4.3				
1970	GIG	90	165	M	Off-2	137	32.4	3.6	4.855	-7.580	219	<0.01
					On-1	84	37.5	6.4				
				F	Off-2	119	32.3	3.8	5.084	-8.069	194	<0.01
					On-1	77	38.3	6.6				
		110	201	M	Off-2	120	35.1	5.2	5.643	4.373	1007	<0.01
					On-1	889	32.7	5.7				
				F	Off-2	141	38.2	6.1	6.979	5.078	1082	<0.01
					On-1	943	35.0	7.1				
		130	238	M	Off-2	317	33.8	5.5	5.616	0.481	746	>0.50
					On-1	431	33.6	5.7				
				F	Off-2	526	37.2	6.8	6.644	-1.754	1110	>0.05
					On-1	586	37.9	6.5				
		150	275	M	Off-2	74	33.8	4.4	4.774	1.565	1077	>0.10
					On-1	1005	32.9	4.8				
				F	Off-2	53	34.6	5.0	5.745	0.975	710	>0.30
					On-1	659	33.8	5.8				
1968	GIG	90	165	M	Off-3	412	40.0	2.3	5.769	39.110	1531	<0.01
1967					On-1a	1121	27.0	6.6				
1968					Off-3	412	40.0	2.3	4.553	38.477	1614	<0.01
1969					On-1b	1204	30.0	5.1				
				F	Off-3	623	42.5	3.1	6.650	41.016	1711	<0.01
					On-1a	1090	28.8	8.0				
					Off-3	623	42.5	3.1	4.961	47.253	1807	<0.01
					On-1b	1186	30.9	5.7				
1970	GIG	80-116	146-212	M	Bin #1[e]	97	37.6	4.5	3.391	-3.678	190	<0.01
					Bin #2[e]	95	39.4	1.6				
		80-116	146-212		Off-3	192	38.5	3.5	4.128	9.133	372	<0.01
		87-120	159-220		On-X	182	34.6	4.7				
		80-116	146-212		Off-3	192	38.5	3.5	5.412	13.620	1207	<0.01
		88-123	161-225		On-1	1017	32.7	5.7				

Table 4 cont'd. T tests[a] of mean lengths from off- and on-bottom trawl catches, by year, location, and depth, for male and female Pacific ocean perch caught off British Columbia, 1967-89.

Year	Loc.[b]	Depth[c] (fms)	Depth[c] (m)	Sex	Net[d]	N	Mean (cm)	S.D. (cm)	Sp	"t"	Df	P
1970	GIG	80-116	146-212	F	Bin #1[e]	127	41.4	4.3	3.581	0.000	255	>0.50
					Bin #2[e]	130	41.4	2.7				
		80-116	146-212		Off-3	257	41.4	3.6	4.728	11.120	449	<0.01
		87-120	159-220		On-X	194	36.4	5.9				
		80-116	146-212		Off-3	257	41.4	3.6	6.391	14.999	1132	<0.01
		88-123	161-225		On-1	877	34.6	7.0				
1971	GIG	65-101	119-185	M	Off-3	123	40.1	2.1	2.972	15.410	280	<0.01
		80-126	146-231		On-X	159	34.6	3.5				
		65-101	119-185	F	Off-3	176	41.6	3.0	4.238	8.560	315	<0.01
		80-126	146-231		On-X	141	37.5	5.4				
1973	MoG	90	165	M	Off-3M	108	41.1	1.8	5.080	5.630	281	<0.01
1973					On-1a	175	37.6	6.3				
1973					Off-3M	108	41.1	1.8	5.710	18.614	483	<0.01
1974					On-1b	377	29.5	6.4				
1973					Off-3M	108	41.1	1.8	5.664	13.335	376	<0.01
1978					On-1c	270	32.5	6.6				
1973	MoG	90	165	F	Off-3M	101	42.5	3.0	5.742	6.731	203	<0.01
1973					On-1a	104	37.1	7.5				
1973					Off-3M	101	42.5	3.0	7.254	14.339	436	<0.01
1974					On-1b	337	30.7	8.1				
1973					Off-3M	101	42.5	3.0	7.504	9.693	344	<0.01
1978					On-1c	245	33.9	8.7				
1989	3D	142	260	M	Off-X	35	37.5	3.1	5.635	0.469	172	>0.50
					On-Xa	139	37.0	6.1				
				F	Off-X	145	40.6	3.6	5.566	-2.082	404	<0.05
					On-Xa	261	41.8	6.4				
1989	3D	164	300	M	Off-X	147	37.7	2.9	4.430	1.921	246	>0.05
					On-Xa	101	36.6	6.0				
				F	Off-X	326	41.4	4.0	4.697	6.998	455	<0.01
					On-Xa	131	38.0	6.1				
1988-89	3Cn	120	220	M	Off-X	19	33.4	3.8	4.489	0.178	120	>0.50
1989	3Cn				On-Xa	103	33.2	4.6				
1988-89	3Cn				Off-X	19	33.4	3.8	2.702	-9.314	255	<0.01

Table 4 cont'd. T tests[a] of mean lengths from off- and on-bottom trawl catches, by year, location, and depth, for male and female Pacific ocean perch caught off British Columbia, 1967-89.

Year	Location[b]	Depth[c] (fms)	Depth[c] (m)	Sex	Net[d]	N	Mean (cm)	S.D. (cm)	Sp	"t"	Df	P
1985	3Cn+3Cs				On-Xb	238	39.4	2.6				
				F	Off-X	180	38.9	2.4	2.597	11.039	285	<0.01
					On-Xa	107	35.4	2.9				
					Off-X	180	38.9	2.4	3.100	-10.575	533	<0.01
1985	3Cn+3Cs				On-Xb	355	41.9	3.4				
1988-89	3Cn	142	260	M	Off-X	111	35.4	3.0	2.921	-10.610	538	<0.01
1985	3Cn+3Cs				On-Xb	429	38.7	2.9				
				F	Off-X	189	38.4	3.3	3.661	-5.728	450	<0.01
					On-Xb	263	40.4	3.9				
1988-89	3Cn	164	300	M	Off-X	176	37.6	3.1	3.033	4.887	267	<0.01
1989	3Cn				On-Xa	93	35.7	2.9				
1988-89	3Cn				Off-X	176	37.6	3.1	2.684	0.000	353	>0.50
1985	3Cn+3Cs				On-Xb	179	37.6	2.2				
				F	Off-X	577	41.3	4.0	3.875	11.061	695	<0.01
					On-Xa	120	37.0	3.2				
					Off-X	577	41.3	4.0	4.072	6.386	696	<0.01
					On-Xb	121	38.7	4.4				
1988-89	3Cn	186	340	M	Off-X	114	40.4	2.5	2.342	9.399	247	<0.01
1985	3Cn+3Cs				On-Xb	135	37.6	2.2				
				F	Off-X	312	43.7	3.7	3.752	8.491	373	<0.01
					On-Xb	63	39.3	4.0				
1988-89	3Cn	208	380	M	Off-X	70	36.8	3.4	2.951	-0.921	97	>0.30
1985	3Cn+3Cs				On-Xb	29	37.4	1.3				
				F	Off-X	188	39.5	2.8	2.609	-0.548	256	>0.50
					On-Xb	70	39.7	2.0				

[a] Dixon and Massey (1969, p. 116).

[b] Locations: GIG = Goose Island Gully (5An+5B); MoG = Moresby Gully (5C); 3Cn = Canadian portion of Area 3C; 3Cs = U.S. portion of Area 3C.

[c] Mid-points of recorded depth intervals: 1967-73, 20-fm depth intervals (90 = 80-99, etc.), equivalent values in meters; 1985-89, 40-m depth intervals (220 = 200-239, etc.), equivalent values in fathoms.

[d] No descriptions for Off-X, and some On-X.nets. See Footnote c in Table 1 for descriptions of some nets.

[e] Replicate samples from landing of Off-3 net.

Table 5. Chi-square tests[a] of sex ratios, by year, location, and depth, in off-bottom and on-bottom trawl catches of Pacific ocean perch off British Columbia, 1967-89. (Source: Tables 2, 3, 6-11, 14- 17)

Net[b]	Location[c]	Year	Depth[d] (fms)	Depth[d] (m)	Range[e] (cm)	Sex	N	Exp.	%M	X^2	Df	P
Off-1	GIG	1967	150	275	20-46	M	370	476.2	40			
						F	552	445.8		74.535	1	<0.01
On-1					18-48	M	1021	914.8	58			
						F	750	856.2				
Off-2	GIG	1970	90	165	20-46	M	137	135.7	54			
						F	119	120.3		0.071	1	>0.70
On-1					10-48	M	84	85.3	52			
						F	77	75.7				
Off-2	GIG	1970	110	201	20-48	M	120	125.8	46			
						F	141	135.2		0.595	1	>0.30
On-1					14-46	M	889	883.2	49			
						F	943	948.8				
Off-2	GIG	1970	130	238	22-48	M	317	339.0	38			
						F	526	504.0		4.120	1	<0.05
On-1					20-48	M	431	409.0	42			
						F	586	608.0				
Off-2	GIG	1970	150	275	24-44	M	74	76.5	58			
						F	53	50.5		0.223	1	>0.50
On-1					20-46	M	1005	1002.5	60			
						F	659	661.5				
Off-3	GIG	1968	90	165	24-50	M	412	488.8	40			
						F	623	546.2		33.572	1	<0.01
On-1a	GIG	1967	90	165	8-48	M	1121	1044.2	51			
						F	1090	1166.8				
Off-3	GIG	1968	90	165	24-50	M	412	488.3	40			
						F	623	546.7		32.378	1	<0.01
On-1b	GIG	1969	90	165	10-46	M	1204	1127.7	50			
						F	1186	1262.3				
Bin #1[f]	GIG	1970	80-116	146-212	22-48	M	97	95.8	43			
						F	127	128.2		0.054	1	>0.80
Bin #2[f]					22-48	M	95	96.2	42			
						F	130	128.8				

Table 5 cont'd. Chi-square tests[a] of sex ratios, by year, location, and depth, in off-bottom and on-bottom trawl catches of Pacific ocean perch off British Columbia, 1967-1989. (Source: Tables 2, 3, 6-11, 14- 17)

Net[d]	Location[b]	Year	Depth[c] (fms)	Depth[c] (m)	Range[e] (cm)	Sex	N	Exp.	%M	X^2	Df	P
Off-3	GIG	1970	80-116	146-212	22-48	M	192	203.5	43			
						F	257	245.5		2.629	1	>0.10
On-X			87-120	159-220	24-46	M	182	170.5	48			
						F	194	205.5				
Off-3	GIG	1970	80-116	146-212	22-48	M	192	231.7	43			
						F	257	217.3		17.375	1	<0.01
On-1			88-123	161-225	18-48	M	1017	977.3	54			
						F	877	916.7				
Off-3	GIG	1971	65-101	119-185	30-46	M	123	140.8	41			
						F	176	158.2		8.458	1	<0.01
On-X			80-126	146-231	6-48	M	159	141.2	53			
						F	141	158.8				
Off-3M	MoG	1973	90	165	34-46	M	108	121.2	52			
						F	101	87.8		5.988	1	<0.02
On-1a	MoG	1973	90	165	18-48	M	175	161.8	63			
						F	104	117.2				
Off-3M	MoG	1973	90	165	34-46	M	108	109.8	52			
						F	101	99.2		0.082	1	>0.30
On-1b	MoG	1974	90	165	18-46	M	377	375.2	53			
						F	337	338.8				
Off-3M	MoG	1973	90	165	34-46	M	108	109.1	52			
						F	101	99.9		0.034	1	>0.80
On-1c	MoG	1978	90	165	12-50	M	270	268.9	52			
						F	245	246.1				
Off-X	3D	1989	142	260	32-50	M	35	54.0	19			
						F	145	126.0		13.848	1	<0.01
On-Xa	3D				18-46	M	139	120.0	35			
						F	261	280.0				
Off-X	3D	1989	164	300	28-52	M	147	166.4	31			
						F	326	306.6		10.591	1	<0.01
On-Xa	3D				30-50	M	101	81.6	44			
						F	131	150.4				

Table 5 cont'd. Chi-square tests[a] of sex ratios, by year, location, and depth, in off-bottom and on-bottom trawl catches of Pacific ocean perch off British Columbia, 1967-89. (Source: Tables 2, 3, 6-11, 14- 17)

Net[d]	Location[b]	Year	Depth[c] (fms)	Depth[c] (m)	Range[e] (cm)	Sex	N	Exp.	%M	X^2	Df	P
Off-X	3Cn	1988-89	120	220	30-48	M	19	59.4	10			
						F	180	139.6		76.163	1	<0.01
On-Xa	3Cn	1989			18-46	M	103	62.6	49			
						F	107	147.4				
Off-X	3Cn	1988-89	120	220	30-48	M	19	64.6	10			
						F	180	134.4		63.595	1	<0.01
On-Xb	3Cn+3Cs	1985			22-48	M	238	192.4	40			
						F	355	400.6				
Off-X	3Cn	1988-89	142	260	28-48	M	111	163.3	37			
						F	189	136.7		52.709	1	<0.01
On-Xb	3Cn+3Cs	1985			24-46	M	429	376.7	62			
						F	263	315.3				
Off-X	3Cn	1988-89	164	300	30-46	M	176	209.7	23			
						F	577	543.3		34.016	1	<0.01
On-Xa	3Cn	1989			28-50	M	93	59.3	44			
						F	120	153.7				
Off-X	3Cn	1988-89	164	300	30-46	M	176	253.9	23			
						F	577	499.1		126.450	1	<0.01
On-Xb	3Cn+3Cs	1985			28-46	M	179	101.1	60			
						F	121	198.9				
Off-X	3Cn	1988-89	186	340	34-50	M	114	170.0	27			
						F	312	256.0		96.711	1	<0.01
On-Xb	3Cn+3Cs	1985			28-46	M	135	79.0	68			
						F	63	119.0				
Off-X	3Cn	1988-89	208	380	30-48	M	70	71.5	27			
						F	188	186.5		0.167	1	>0.50
On-Xb	3Cn+3Cs	1985			34-44	M	29	27.5	29			
						F	70	71.5				

[a] Test: Dixon and Massey (1969, p. 240).
[b] Net: No descriptions for Off-X and On-X. See Footnote c in Table 1 for other types.
[c] Locations: GIG = Goose Island Gully (5An+5B);MoG = Moresby Gully (5C); 3Cn = Canadian portion of Area 3C; 3Cs = U.S. portion of Area 3C..
[d] Depth: Mid-points of recorded depth intervals: 1967-73, 20-fm depth intervals (90 = 80-99, etc.), equivalent values in meters; 1985-89, 40-m depth intervals (220 = 200-259, etc.), equivalent values in fathoms.
[e] Range: Size range, combined sexes.
[f] Bins: Nos. 1 and 2 are replicate samples from the landing of the Off-3 catch.

Table 6. Length-frequencies (nos.), by 20-fm depth interval, and selected statistics for male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-2) and on-bottom (On-1) trawls in northwest Goose Island Gully, June 1970. (Source: Appendix tables 2a,b,c,d)

Interval[a]	(fms)	90		110		130		150	
	(m)	165		201		238		275	
Off-bottom Hauls (nos.)		1		2		2		1	
Fork length (cm)		M	F	M	F	M	F	M	F
10		...	...	...	...	...	...	...	...
12		...	...	...	...	...	...	...	...
14		...	...	...	...	...	...	...	...
16		...	...	...	...	...	...	...	...
18		...	...	...	...	...	...	...	...
20		...	1	1	...	...	...	...	...
22		...	1	0	...	5	...	...	...
24		1	1	4	3	15	18	1	...
26		1	2	6	4	28	43	2	2
28		16	9	4	7	29	32	15	5
30		33	30	9	9	34	31	5	12
32		39	36	17	9	21	35	5	5
34		28	16	17	13	26	28	9	3
36		4	15	8	11	34	23	15	4
38		2	1	17	4	61	27	17	9
40		8	2	27	14	52	48	4	9
42		5	3	8	33	12	118	1	2
44		...	1	2	22	...	108	...	2
46		...	1	...	11	...	11	...	...
48		...	...	...	1	...	1	...	...
Total		137	119	120	141	317	523	74	53
Mean	(cm)	32.4	32.3	35.1	38.2	33.8	37.3	33.8	34.6
S.D.	(cm)	3.6	3.8	5.2	6.1	5.5	6.7	4.4	5.0
%M		53.5		46.0		37.7		58.3	

Table 6 cont'd. Length-frequencies (nos.), by 20-fm depth interval, and selected statistics for male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-2) and on-bottom (On-1) trawls in northwest Goose Island Gully, June 1970. (Source: Appendix tables 2a,b,c,d)

Interval[a] (fms)		90		110		130		150	
(m)		165		201		238		275	
On-bottom Hauls (nos.)		2		6		3		4	
Fork length (cm)	M	F	M	F	M	F	M	F	
10	1	...	...	...	...	...	...	...	
12	0	...	...	...	...	...	...	...	
14	0	...	...	2	...	...	...	...	
16	0	...	4	3	...	...	...	...	
18	0	...	3	2	...	...	...	...	
20	3	...	10	12	3	1	2	...	
22	1	2	12	21	10	2	5	5	
24	1	2	49	40	17	25	35	22	
26	2	2	82	55	46	35	100	60	
28	1	2	88	71	37	26	132	84	
30	2	6	108	94	44	29	119	93	
32	3	6	104	85	37	16	75	56	
34	3	3	119	107	19	35	93	51	
36	2	3	50	58	48	29	187	49	
38	13	3	105	36	78	47	184	72	
40	30	9	110	59	76	70	70	82	
42	20	17	43	150	15	129	3	58	
44	2	17	2	122	1	117	...	23	
46	...	4	...	26	...	24	...	4	
48	...	1	...	...	...	1	...	...	
Total	84	77	889	943	431	586	1005	659	
Mean (cm)	37.5	38.3	32.7	35.0	33.6	37.9	32.9	33.8	
S.D. (cm)	6.4	6.6	5.7	7.1	5.7	6.5	4.8	5.8	
%M	52.2		48.5		42.4		60.0		

[a] Interval: Mid-points of 20-fm depth intervals (90 = 80-99, etc.). Equivalent values in meters.

Table 7. Length-frequencies (nos.,%), by net and year, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-3) of the F/V *Royal Canadian*, and by on-bottom (On-1a,b) trawls of the R/V *G.B. Reed*, at the 80-99 fm depth interval, in northeast, east, and southeast Goose Island Gully, 1967 and 1969 (Source: Appendix tables 4-6).

Hauls (nos.)	Off-3 (Aug 68)				On-1a (Sep 67)				On-1b (Sep 69)			
	8				5				5			
Fork	Males		Females		Males		Females		Males		Females	
length (cm)	N	%	N	%	N	%	N	%	N	%	N	%
8	...	...	...	...	1	0.1	1	0.1	...	...	...	...
10	...	...	...	...	4	0.4	3	0.3	...	...	1	0.1
12	...	...	...	...	10	0.9	16	1.5	4	0.3	3	0.3
14	...	...	...	...	12	1.1	8	0.7	3	0.2	0	0
16	...	...	...	...	53	4.7	37	3.4	4	0.3	4	0.3
18	...	...	...	...	63	5.6	53	4.9	10	0.8	11	0.9
20	...	...	...	...	102	9.1	72	6.6	17	1.4	18	1.5
22	...	...	...	...	58	5.2	45	4.1	47	3.9	26	2.2
24	...	...	2	0.3	72	6.4	67	6.1	85	7.1	76	6.4
26	...	...	0	0	177	15.8	179	16.4	170	14.1	139	11.7
28	...	...	0	0	181	16.1	174	16.0	147	12.2	158	13.3
30	...	...	0	0	107	9.5	107	9.8	196	16.3	175	14.8
32	...	...	0	0	46	4.1	46	4.2	243	20.2	227	19.1
34	10	2.4	11	1.8	84	7.5	52	4.8	114	9.5	148	12.5
36	35	8.5	21	3.4	71	6.3	55	5.0	42	3.5	47	4.0
38	78	18.9	40	6.4	46	4.1	24	2.2	59	4.9	43	3.6
40	139	33.7	84	13.5	19	1.7	27	2.5	40	3.3	22	1.9
42	119	28.9	148	23.8	12	1.1	28	2.6	21	1.7	32	2.7
44	31	7.5	207	33.2	2	0.2	61	5.6	2	0.2	37	3.1
46	...	...	95	15.2	1	0.1	33	3.0	...	...	19	1.6
48	...	...	14	2.2	...	...	2	0.2	...	...	...	...
50	...	...	1	0.2	...	...	...	...	...	...	...	...
Total	412	100.0	623	100.0	1121	100.0	1090	100.0	1204	100.0	1186	100.0

Table 7 cont'd. Length-frequencies (nos.,%), by net and year, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-3) of the F/V *Royal Canadian*, and by on-bottom (On-1a,b) trawls of the R/V *G.B. Reed*, at the 80-99 fm depth interval, in northeast, east, and southeast Goose Island Gully, 1967and 1969. (Source: Appendix tables 4-6)

Hauls (nos.)		Off-3 (Aug 68) 8		On-1a (Sep 67) 5		On-1b (Sep 69) 5	
		Males	Females	Males	Females	Males	Females
Mean	(cm)	40.0	42.5	27.0	28.8	30.0	30.9
S.D.	(cm)	2.3	3.1	6.6	8.0	5.1	5.7
%M		66.1		50.7		50.4	
Depth[a]							
Bottom	(fms)	70-99		80-99		88-98	
	(m)	128-181		146-181		161-179	
Above	(fms)	0-20		...		...	
bottom	(m)	0-37		...		...	
Catch:							
Total	(lbs)	25686		10212		15742	
POP	(lbs)	5980		4244		9120	
% POP		23.3		41.6		57.9	

[a] Depth range at beginnings and endings of all hauls.

Table 8. Length frequencies (nos.; %) and selected statistics, for male and female Pacific ocean perch caught by off-bottom (Off-3) and on-bottom (On-X) trawls of chartered, domestic, commercial vessels, and the on-bottom (On-1) trawl of the R/V *G.B. Reed*, in northeast and southeast Goose Island Gully, June-July 1970. (Sources: Harling (1968); Appendix table 8)

Fork length (cm)	Off-bottom[a]								On-bottom							
	Canadian No. 1 (Off-3)								*Royal Canadian* (On-X)				*G.B. Reed* (On-1)			
	Bin #1		Bin #2		Males		Females		Males		Females		Males		Females	
	M	F	M	F	N	%	N	%	N	%	N	%	N	%	N	%
18	...	...	...	...	...	...	...	...	...	...	...	...	1	0.1	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	6	0.6	...	...
22	...	...	...	...	...	...	...	...	...	...	1	0.5	9	0.9	10	1.1
24	...	1	...	...	...	...	1	0.4	1	0.5	1	0.5	44	4.3	24	2.7
26	3	3	...	...	3	1.6	3	1.2	9	4.9	10	5.2	123	12.1	83	9.5
28	7	2	...	1	7	3.6	3	1.2	20	11.0	17	8.8	140	13.8	123	14.0
30	3	1	...	0	3	1.6	1	0.4	18	9.9	17	8.8	151	14.8	134	15.3
32	5	1	...	2	5	2.6	3	1.2	21	11.5	16	8.2	106	10.4	90	10.3
34	1	0	...	1	1	0.5	1	0.4	19	10.4	17	8.8	61	6.0	49	5.6
36	3	1	6	2	9	4.7	3	1.2	21	11.5	15	7.7	52	5.1	23	2.6
38	21	13	30	12	51	26.6	25	9.7	31	17.0	16	8.2	111	10.9	26	3.0
40	40	16	46	30	86	44.8	46	17.9	37	20.3	30	15.5	151	14.8	51	5.8
42	14	35	13	44	27	14.1	79	30.7	4	2.2	28	14.4	60	5.9	97	11.1
44	...	42	...	37	...	...	79	30.7	1	0.5	22	11.3	2	0.2	124	14.1
46	...	12	...	1	...	...	13	5.1	...	...	3	1.5	...	...	41	4.7
48	...	...	...	...	...	...	...	...	...	...	1	0.5	...	...	2	0.2
Total	97	127	95	130	192	100.0	257	100.0	182	100.0	194	100.0	1017	100.0	877	100.0
Mean	37.6	41.4	39.4	41.4	38.5		41.4		34.6		36.4		32.7		34.6	
S.D.	4.5	4.3	1.6	2.7	3.5		3.6		4.7		5.9		5.7		7.0	
%M	43.3		42.2		42.8				48.4				54.0			

Table 8 cont'd. Length frequencies (nos.; %) and selected statistics, for male and female Pacific ocean perch caught by off-bottom (Off-3) and on-bottom (On-X) trawls of chartered, domestic, commercial vessels, and the on-bottom (On-1) trawl of the R/V *G.B. Reed*, in northeast and southeast Goose Island Gully, June-July 1970. (Sources: Harling (1968); Appendix table 8)

	Off-bottom[a]								On-bottom							
Fork	*Canadian No. 1* (Off-3)								*Royal Canadian* (On-X)				*G.B. Reed* (On-1)			
length	Bin #1		Bin #2		Males		Females		Males		Females		Males		Females	
(cm)	M	F	M	F	N	%	N	%	N	(%)	N	%	N	%	N	%
Catch:																
Total	(lbs)					143219				129417				17010		
POP	(lbs)					84675				103520				11375		
%POP						59.1				80.0				66.9		

[a] Bin nos. 1 and 2 are replicate samples from the Off-3 landing.

Table 9. Length-frequencies (nos.;%) and selected statistics for male and female Pacific ocean perch caught by the F/V *Royal Canadian* off-bottom (Off-3) and on-bottom (On-X) trawls in Goose Island Gully, July 1971. (Source: Smith *et al.* 1972)

Fork length (cm)	Off-bottom				On-bottom			
	Males		Females		Males		Females	
	N	%	N	%	N	%	N	%
26	...	...	...	...	1	0.6	1	0.7
28	...	...	...	...	6	3.8	3	2.1
30	...	...	1	0.6	18	11.3	11	7.8
32	1	0.8	1	0.6	29	18.2	15	10.6
34	3	2.4	4	2.3	38	23.9	28	19.9
36	4	3.3	7	4.0	30	18.9	20	14.2
38	18	14.6	13	7.4	15	9.4	9	6.4
40	60	48.8	40	22.7	16	10.1	8	5.7
42	31	25.2	54	30.7	6	3.8	8	5.7
44	6	4.9	38	21.6	...	...	28	19.9
46	...	...	16	9.1	...	...	9	6.4
48	...	...	2	1.1	...	...	1	0.7
Total	123	100.0	176	100.0	159	100.0	141	100.0
Mean (cm)	40.1		41.6		34.6		37.5	
S.D. (cm)	2.1		3.0		3.5		5.4	
%M	41.1				53.0			

Table 10. Length-frequencies (nos.,%), by year, and selected statistics for male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-3M) and on-bottom (On-1) trawls, at the 80-99 fm depth interval in Moresby Gully, July 1973, and September 1974 and 1978. (Source: Westrheim *et al.* 1973; Appendix table 9)

Fork length (cm)	1973[a]								1974				1978			
	Off-bottom (Off-3M)				On-bottom (On-1a)				On-bottom (On-1b)				On-bottom (On-1c)			
	Males		Females		Males		Females		Males		Females		Males		Females	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
12	...	...	...	...	...	...	...	...	...	...	...	...	1	0.4	...	...
14	...	...	...	...	...	...	...	...	...	...	...	...	0	0.0	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	2	0.7	...	...
18	...	...	...	...	...	...	1	1.0	...	...	1	0.3	0	0.0	3	1.2
20	...	...	...	...	...	...	0	0	2	0.5	4	1.2	4	1.5	5	2.0
22	...	...	...	...	3	1.7	1	1.0	39	10.3	40	11.9	10	3.7	12	4.9
24	...	...	...	...	7	4.0	3	2.9	77	20.4	66	19.6	33	12.2	25	10.2
26	...	...	...	...	7	4.0	5	4.8	46	12.2	33	9.8	16	5.9	26	10.6
28	...	...	...	...	15	8.6	7	6.7	49	13.0	35	10.4	6	2.2	9	3.7
30	...	...	...	...	5	2.9	12	11.5	47	12.5	32	9.5	25	9.3	18	7.3
32	...	...	...	...	5	2.9	8	7.7	26	6.9	30	8.9	43	15.9	36	14.7
34	1	0.9	3	3.0	3	1.7	7	6.7	26	6.9	18	5.3	47	17.4	20	8.2
36	1	0.9	5	5.0	9	5.1	2	1.9	12	3.2	10	3.0	17	6.3	10	4.1
38	10	9.3	5	5.0	7	4.0	8	7.7	4	1.1	3	0.9	10	3.7	2	0.8
40	37	34.3	11	10.9	36	20.6	7	6.7	6	1.6	3	0.9	21	7.8	3	1.2
42	46	42.6	24	23.8	61	34.9	8	7.7	23	6.1	2	0.6	22	8.1	9	3.7
44	13	12.0	34	33.7	17	9.7	18	17.3	17	4.5	21	6.2	10	3.7	25	10.2
46	...	...	19	18.8	...	...	15	14.4	3	...	32	9.5	2	0.7	32	13.1
48	...	...	...	...	...	...	2	1.9	...	...	7	2.1	1	0.4	8	3.3
50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	0.8
Total	108	100	101	100	175	100	104	100	377	100	337	100	270	100	245	100
Mean	41.1		42.5		37.6		37.1		29.5		30.7		32.5		33.9	
S.D.	1.8		3.0		6.3		7.5		6.4		8.1		6.6		8.7	
%M	51.7				62.7				52.8				52.4			

Table 10 cont'd. Length-frequencies (nos.,%), by year, and selected statistics for male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-3M) and on-bottom (On-1) trawls, at the 80-99 fm depth interval in Moresby Gully, July 1973, and September 1974 and 1978. (Source: Westrheim *et al.* 1973; Appendix table 9)

Fork length (cm)		1973[a]								1974				1978			
		Off-bottom (Off-3M)				On-bottom (On-1a)				On-bottom (On-1b)				On-bottom (On-1c)			
		Males		Females		Males		Females		Males		Females		Males		Females	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Bottom	(fms)	92-88				90-91				89-94				90-94			
	(m)	168-161				165-167				163-172				165-172			
Net	(fms)	89-86															
	(m)	163-157															
Catch:																	
Total	(lbs)	542				12783				6284				4377			
POP	(lbs)	497				4763				753				909			
%POP		91.7				37.3				12.0				20.8			

[a] Off-bottom: Haul 55; On-bottom: Haul 34.

Table 11. Length-frequencies (nos.), by 40-m depth interval (260-500), of male and female Pacific ocean perch caught by foreign vessels in Area 3D, June-August 1989. (Source: Appendix tables 10, 11a,b)

Interval[a]	(m)	260		300		340		380		420		460		500	
	(fms)	142		164		186		208		230		251		251	
Samples	(nos.)	1		2		2		3		1		3		1	
Fork length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F
28		...	...	...	1	...	...	...	...	...	...	...	...	...	...
30		...	...	...	0	...	...	2	...	1	...	...	...	...	...
32		1	...	8	1	4	3	9	3	8	1	1	2	1	...
34		6	6	17	8	6	12	13	20	27	8	21	16	3	2
36		13	24	44	44	25	39	70	49	23	22	56	54	15	17
38		8	29	43	67	37	73	52	105	5	32	48	101	6	31
40		3	26	18	54	8	53	19	55	3	20	38	71	10	41
42		0	21	6	50	12	49	5	51	1	23	10	83	5	17
44		4	25	11	32	3	32	2	32	...	7	1	56	...	17
46		...	10	...	44	1	23	1	13	...	5	...	36	...	13
48		...	3	...	18	...	11	...	3	...	0	...	13	...	5
50		...	1	...	6	...	1	...	1	...	1	...	2	...	...
52		...	...	...	1	...	...	...	...	...	...	...	...	...	...
Total		35	145	147	326	96	296	173	332	68	119	175	434	40	143
Mean	(cm)	37.5	40.6	37.7	41.4	38.1	40.5	37.1	39.6	35.2	39.5	37.7	40.8	38.0	40.8
S.D.	(cm)	3.1	3.6	2.9	4.0	2.8	3.6	2.5	3.2	2.2	3.2	2.3	3.5	2.6	3.3
%M		19.4		31.1		24.5		34.3		36.4		28.7		21.9	
Catch:															
Total	(t)	10.4		5.4		46.2		38.5		4.3		77.0		45.5	
	(lbs)	22922		11902		101825		84854		9477		169708		100282	
POP	(t)	0.3		2.4		16.5		25.9		1.6		24.8		1.0	
	(lbs)	661		5290		36366		57084		3526		54659		2204	
%POP		2.9		44.4		35.7		67.3		37.2		32.2		2.2	
Summary:															
Hauls		13													
Total catch	(t)	227.3													
	(lbs)	500969													
POP catch	(t)	72.5													
	(lbs)	159809													
% POP		31.9													

[a] Interval: Mid-points of 40-m depth intervals (260 = 240-279, etc.). Equivalent values in fathoms.

Table 12. Regression analysis of mean length on depth for male and female Pacific ocean perch caught by foreign-vessel off-bottom trawls, and domestic-vessel on-bottom trawls, in Areas 3D and 3C, 1985 and 1988-89. (Source: Appendix tables 11a,b; 13a,b; and 14a,b,c)

Location	Area 3D		Area 3C			
Vessel	(foreign)		(foreign)		(domestic)	
Net	Off-X		Off-X		On-Xb	
N	7		9		5	
Sex	M	F	M	F	M	F
Intercept	37.8	41.4	31.1	35.0	42.0	44.1
"t"	19.026	31.365	15.846	19.419	45.873	18.237
P	0.000	0.000	0.000	0.000	0.000	0.000
Slope	-0.001	-0.002	0.017	0.016	-0.013	-0.014
"t"	-0.244	-0.529	3.132	3.232	-4.255	-1.735
P	0.817	0.619	0.017	0.014	0.024	-0.181
r	0.109	0.230	0.764	0.774	0.926	0.708
R^2	0.012	0.053	0.584	0.599	0.858	0.501

Table 13. T- tests[a] and ANOVA[b]: Pacific ocean perch mean lengths by sex, caught by foreign vessel off-bottom trawls (Off-X) areas 3D and 3Cn, at selected depth intervals, 1988-1989. (Source: Appendix tables 11a,b and 13a,b)

Area	Depth[c] (fms)	(m)	Sex	Sample	N	Mean	S.D.	Sp	"t"	Df	P
3D	186	340	M	67141	55	37.0	2.5	2.587	-4.122	94	<0.01
				67306	41	39.2	2.7				
			F	67141	149	39.2	3.3	3.452	-4.984	294	<0.01
				67306	147	41.2	3.6				
3Cn	251	460	M	67222	28	40.1	2.3	3.198	2.223	93	>0.20
				66890	67	38.5	3.5				
			F	67222	203	44.4	3.0	3.586	9.494	399	>0.05
				66890	198	41.0	4.1				

ANOVA

Area	Depth[c] (fms)	(m)	Sex	Sample	N	Mean	Var.	F	P
3D	208	380	M	67169	57	36.2	4.8		
				66970	83	37.1	6.8	1.181	>0.05
				67312	33	37.8	4.4		
			F	67169	151	39.2	9.6		
				66970	96	38.6	9.0	0.576	>0.05
				67312	85	40.6	11.6		
	251	460	M	67114	69	38.3	5.8		
				67000	64	36.6	3.2	1.196	>0.05
				67118	42	37.7	4.8		
			F	67114	181	41.1	13.7		
				67000	124	38.8	7.3	1.193	>0.05
				67118	129	41.1	13.0		
3Cn	164	300	M	66519	64	36.5	8.0		
				66277	43	39.7	6.0	0.454	>0.05
				66896	69	37.3	9.8		
			F	66519	248	41.0	18.3		
				66277	198	42.7	10.5	0.386	>0.05
	230	420	M	66289	22	35.4	6.8		
				67216	16	39.9	5.0		
				66974	41	40.8	10.4	1.704	>0.05
				66924	91	37.7	14.5		
				67131	45	37.7	9.7		
			F	66289	246	41.6	12.3		
				67216	249	42.0	13.9		
				66974	62	42.5	11.4	1.075	>0.05
				66924	104	40.8	12.5		
				67131	129	39.6	14.5		

[a] Dixon and Massey (1969, p. 116)
[b] Snedecor (1946, p. 232)
[c] Depth: Mid-points of 40-m depth intervals (e.g. 300 = 280-319). Equivalent values in fathoms.

Table 14. Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the F/V *Ocean Selector* on-bottom (On-Xa) trawl, at selected 40-m depth intervals (220-300) in Area 3D, July 1989. (Source: Gillespie and Leaman 1990)

Haul		12		14		Total		13		15		Total		Total (16)	
Interval:[a]	(m)	210		210		220		247		256		260		300(289)	
	(fms)	115		115		120		135		135		142		164(158)	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F
18		1	...	1	1	2	1	1	1	...	...	1	1	...	...
20		0	...	1	0	1	0	10	4	...	...	10	4	...	...
22		0	...	2	0	2	0	25	9	...	...	25	9	...	...
24		0	1	2	3	2	4	30	29	...	...	30	29	...	...
26		0	1	2	0	2	1	22	24	1	...	23	24	...	...
28		1	0	0	1	1	1	13	9	1	...	14	9	...	...
30		0	0	0	0	0	0	8	5	0	1	8	6	1	...
32		1	0	1	0	2	0	3	13	5	1	8	14	6	7
34		11	1	5	5	16	6	...	5	9	6	9	11	19	11
36		13	10	10	8	23	18	...	...	13	7	13	7	38	38
38		17	15	24	9	41	24	...	...	24	11	24	11	17	34
40		10	27	19	16	29	43	...	...	47	6	47	6	14	20
42		7	37	9	21	16	58	...	...	48	13	48	13	6	11
44		1	15	0	12	1	27	...	...	9	9	9	9	...	6
46		...	22	1	31	1	53	...	...	1	7	1	7	...	2
48		...	8	...	16	...	24	...	...	...	...	...	...	...	1
50		...	...	...	1	...	1	...	...	...	...	...	...	...	1
Total		62	137	77	124	139	261	112	99	158	61	270	160	101	131
Mean	(cm)					37.0	41.8					33.3	31.5	36.6	38.0
S.D.	(cm)					4.8	4.7					8.0	7.7	2.6	3.3
%M		31.2		38.3		34.8		53.1		72.1		62.8		43.5	

[a] Interval: Mid-points of 40-m depth intervals (220 = 210-229, etc.). Equivalent values in fathoms.

Table 15. Length-frequencies (nos.), by 40-m depth interval (140 and 220-500), of male and female Pacific ocean perch in off-bottom (Off-X) trawl catches by foreign vessels in Area 3Cn, May-September 1988-89. (Source: Appendix tables 12 and 13a,b)

Interval[a]	(m)	140		220		260		300		340		380		420		460		500	
	(fms)	77		120		142		164		186		208		230		230		273	
Samples	(nos.)	1		1		1		3		2		1		5		2		1	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
26		2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28		9	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...
30		15	...	6	...	0	1	1	...	...	...	1	...	3	...	...	...	...	...
32		23	6	7	3	15	3	5	5	...	...	2	...	13	2	3	2	4	1
34		8	20	1	2	43	18	34	39	...	2	9	6	34	27	9	16	10	7
36		20	44	0	21	31	45	41	59	9	10	10	6	32	70	17	32	13	10
38		2	12	3	75	11	53	40	63	24	28	8	24	43	120	14	20	10	21
40		...	...	1	59	4	33	24	107	38	51	20	31	40	179	27	53	10	26
42		...	...	1	12	3	16	22	78	31	38	14	64	30	102	12	60	6	19
44		...	...	...	4	1	11	9	96	6	34	6	41	16	118	13	85	2	27
46		...	...	...	1	0	7	...	100	4	79	...	15	2	137	...	85	...	21
48		...	...	...	3	2	2	...	29	2	64	...	1	2	33	...	43	...	3
50		...	...	...	...	...	...	...	1	...	6	...	...	...	2	...	5	...	...
Total		79	82	19	180	111	189	176	577	114	312	70	188	215	790	95	401	55	135

Table 15 cont'd. Length-frequencies (nos.), by 40-m depth interval (140 and 220-500), of male and female Pacific ocean perch in off-bottom (Off-X) trawl catches by foreign vessels in Area 3Cn, May-September 1988-89. (Source: Appendix tables 12 and 13a,b)

Interval[a]	(m)	140		220		260		300		340		380		420		460		500	
	(fms)	77		120		142		164		186		208		230		230		273	
Samples	(nos.)	1		1		1		3		2		1		5		2		1	
Fork length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Mean	(cm)	32.4	35.5	33.4	38.9	35.4	38.4	37.6	41.3	40.4	43.7	38.8	41.5	38.1	41.4	39.0	42.7	37.4	41.2
S.D.	(cm)	3.0	1.6	3.8	2.4	3.0	3.3	3.1	4.0	2.5	3.7	3.4	2.8	3.7	3.7	3.3	4.0	3.2	3.7
%M		49.1		9.5		37.0		23.4		26.8		27.1		21.4		19.2		28.9	
Catch:																			
Total	(t)		10.6		23.5		15.0		64.6		34.8		17.6		104.3		29.5		26.3
	(lbs)		23362		51794		33060		142378		76699		38790		229877		65018		57965
POP	(t)		1.2		1.4		1.0		19.6		3.2		1.6		17.2		20.3		0.3
	(lbs)		2645		3086		2204		43198		7053		3526		37909		44741		661
%POP			11.3		6.0		6.7		30.3		9.2		9.1		16.5		68.8		1.1
Hauls			17																
Total catch	(t)		326.2																
	(lbs)		718945																
POP catch	(t)		65.8																
	(lbs)		145023																
%POP			20.2																

[a] Interval: Mid-points of 40-m depth intervals (140 = 120-159, etc.). Equivalent values in fathoms..

Table 16. Length-frequencies (nos.), by haul number and 40-m depth interval (220-300), of male and female Pacific ocean perch caught by the F/V *Ocean Selector* on-bottom (On-Xa) trawl in Area 3Cn, July 1989. (Source: Gillespie and Leaman 1990)

Haul		20		21		Total		19		18	
Interval[a]	(m)	183		192		180		220		300 (289)	
	(fms)	100		105		98		125		164 (158)	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F
18		...	1	...	...	...	1	1	...	...	...
20		3	1	1	...	4	1	0	...	...	...
22		0	0	0	...	0	0	2	1	...	...
24		3	2	0	...	3	2	4	1	...	...
26		17	14	0	2	17	16	4	6	...	...
28		27	8	1	0	28	8	7	4	1	...
30		9	6	1	0	10	6	7	3	1	2
32		4	1	7	4	11	5	14	16	12	8
34		3	2	13	16	16	18	29	25	24	18
36		2	0	15	15	17	15	18	11	32	39
38		2	1	18	25	20	26	10	12	11	26
40		...	0	11	20	11	20	4	13	11	14
42		...	0	7	12	7	12	2	8	0	7
44		...	1	2	18	2	19	1	4	0	4
46		...	...	...	10	...	10	...	3	0	2
48		...	...	...	2	...	2	...	...	0	...
50		...	...	...	...	...	...	...	...	1	...
Total		70	37	76	124	146	161	103	107	93	120
Mean	(cm)					32.7	36.7	33.2	35.4	35.7	37.0
S.D.	(cm)					5.6	6.4	4.6	5.1	2.9	3.2
%M		65.4		38.0		47.6		49.0		43.7	

[a] Interval: Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Table 17. Length-frequencies (nos.), by 40-m depth interval (200-380), of male and female Pacific ocean perch caught by the F/V *Howe Bay* on-bottom (On-Xb) trawl in Area 3C (3Cn+3Cs), September 1985. (Source: Appendix tables 14a,b,c)

Interval[a]	(m)	220		260		300		340		380	
	(fms)	120		142		164		164		208	
Hauls	(nos.)	4		7		4		2		1	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F
22		...	1	...	...	...	...	...	...	...	...
24		...	0	1	1	...	...	...	...	...	...
26		...	0	1	2	...	...	...	...	...	...
28		1	1	3	1	1	2	...	1	...	...
30		3	0	11	1	3	1	2	2	...	...
32		4	1	6	9	18	18	6	3	...	...
34		5	14	17	19	16	10	4	5	1	1
36		18	24	34	14	20	9	25	4	9	6
38		46	12	114	18	50	12	71	5	17	18
40		113	43	184	53	53	22	21	16	2	25
42		38	121	54	80	17	30	6	20	...	19
44		10	91	4	55	1	13	...	6	...	1
46		...	38	...	10	...	4	...	1	...	...
48		...	9	...	...	...	...	...	...	...	...
Total		238	355	429	263	179	121	135	63	29	70
Mean	(cm)	39.4	41.9	38.7	40.4	37.6	38.7	37.6	39.3	37.4	39.7
S.D.	(cm)	2.6	3.4	2.9	3.9	3.2	4.4	2.2	4.0	1.3	2.0
%M		40.1		62.0		59.7		68.2		29.3	

[a] Interval: Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Table 18. Summary of comparisons, for numbers of modes, mean length, and sex ratio, of off-bottom vs on-bottom trawl catches off British Columbia during 1967-89.

Net[a]	Year	Month	Loc.[b]	Depth[c]		Off *vs* On[d]					
				(fms)	(m)	% POP	Modes M	Modes F	Mean length M	Mean length F	Sex ratio (%M)
Off-1	1967	Oct	GIG	150	275	62	2	2			
On-1		Sep	GIG			75	2	2	<<	<<	<<
Off-2	1970	Jun	GIG	90	165	27	1	1	<<	<<	>
On-1						6	1	2			
Off-2	1970	Jun	GIG	110	201	85	2	2			
On-1						72	2	2	>>	>>	<
Off-2	1970	Jun	GIG	130	238	94	2	2			
On-1						80	2	2	>	<	<<
Off-2	1970	Jun	GIG	150	275	82	2	2			
On-1						67	2	2	>	>	<
Off-3	1968	Aug	GIG	90	165	23	1	1			
On-1a	1967	Sep				42	3	3	>>	>>	<<
On-1b	1969	Sep				58	2	2	>>	>>	<<
Off-3	1970	Jul	GIG	90,110	165,201	59	1	1			
On-X		Jul		90,110	165,201	80	3	2	>>	>>	<
On-1		Jun		90-130	165-238	67	2	2	>>	>>	<<
Off-3	1971	Jul	GIG	90,110	165,201	100	1	1			
On-X				90,110	165,201	70	2	2	>>	>>	<<
Off-3M	1973	Jul	MoG	90	165	92	1	1			
On-1a	1973	Jul				37	2	2	>>	>>	<<
On-1b	1974	Sep				12	3	3	>>	>>	<
On-1c	1978	Sep				21	3	3	>>	>>	<>
Off-X	1989	Jun-Aug	3D	142	260	3	1	2			
On-Xa		Jul					1	2	>	<<	<<
Off-X		Jun-Aug	3D	164	300	44	2	2			
On-Xa		Jul					2	2	>	>>	<<

Table 18 cont'd. Summary of comparisons, for numbers of modes, mean length, and sex ratio, of off-bottom vs on-bottom trawl catches off British Columbia during 1967-89.

Net[a]	Year	Month	Loc.[b]	Depth[c]		Off *vs* On[d]					
				(fms)	(m)	% POP	Modes		Mean length		Sex ratio
							M	F	M	F	(%M)
Off-X	1988-89	May-Sep	3Cn	120	220	6	2	1			
On-Xa	1989	Jul	3Cn				1	2	>	>>	<<
On-Xb	1985	Sep	3C				1	2	<<	<<	<<
Off-X	1988-89	May-Sep	3Cn	142	260	7	1	1			
On-Xb	1985	Sep	3C				2	2	<<	<<	<<
Off-X	1988-89	May-Sep	3Cn	164	300	30	1	2			
On-Xa	1989	Jul	3Cn				1	1	>>	>>	<<
On-Xb	1985	Sep	3C				2	2	<>	>>	<<
Off-X	1988-89	May-Sep	3Cn	186	340	9	1	2			
On-Xb	1985	Sep	3C				1	1	>>	>>	<<
Off-X	1988-89	May-Sep	3Cn	208	380	9	2	1			
On-Xb	1985	Sep	3C				1	1	<	<	<

[a] Net:No description of Off-X or On-X. See text or literature for others.
[b] Location: GIG = Goose Island Gully; MoG = Moresby Gully; 3C = 3Cn+3Cs; 3Cn = Canadian portion of Area 3C; 3Cs = U.S. portion of Area 3C.
[c] Depth: For 1967-78, mid-points of 20-fm depth intervals (90 = 80-99, etc.); equivalent values in meters. For 1985-89, mid-points of 40-m depth intervals (220 = 200-239, etc.); equivalent values in fathoms.
[d] Off-bottom vs On-bottom: < = less than; << = significantly less than; > = greater than; >> = significantly greater than; <> = equal.

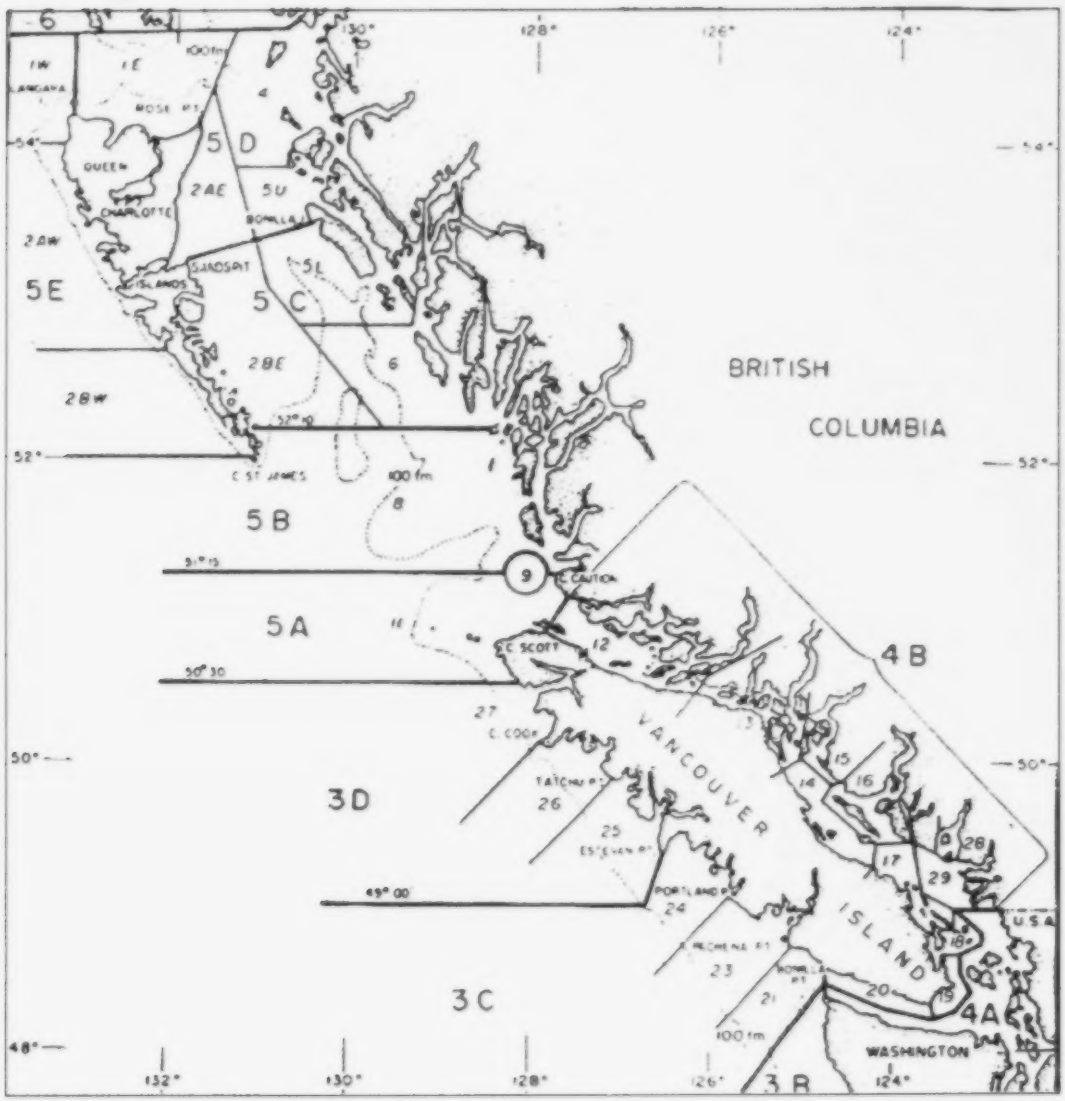


Fig. 1. Groundfish statistical areas off British Columbia.

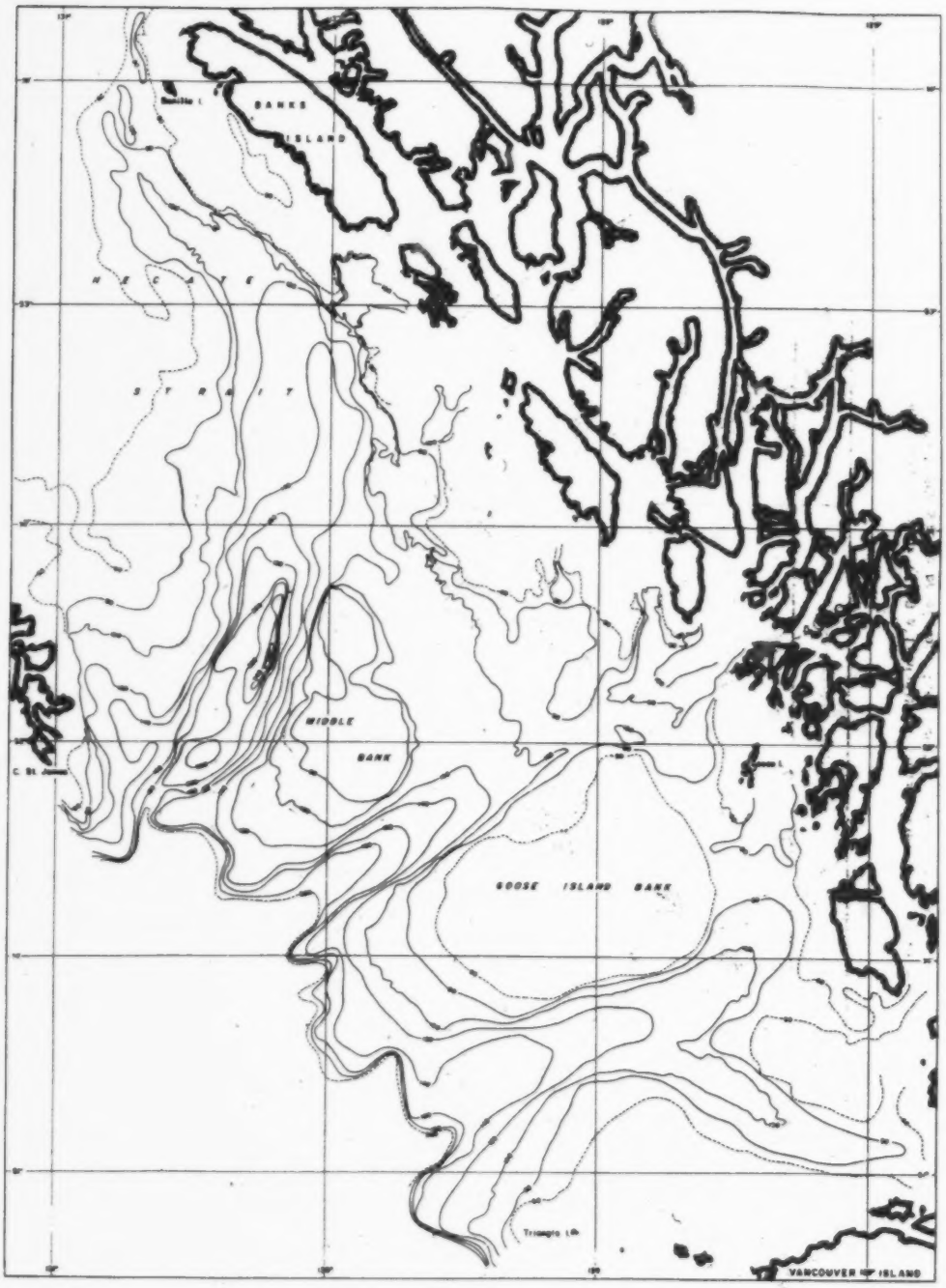


Figure 2. Bathymetric chart of Queen Charlotte Sound and southern Hecate Strait. Contours in fathoms. (Source: Fig. 5 in Westrheim 1972)

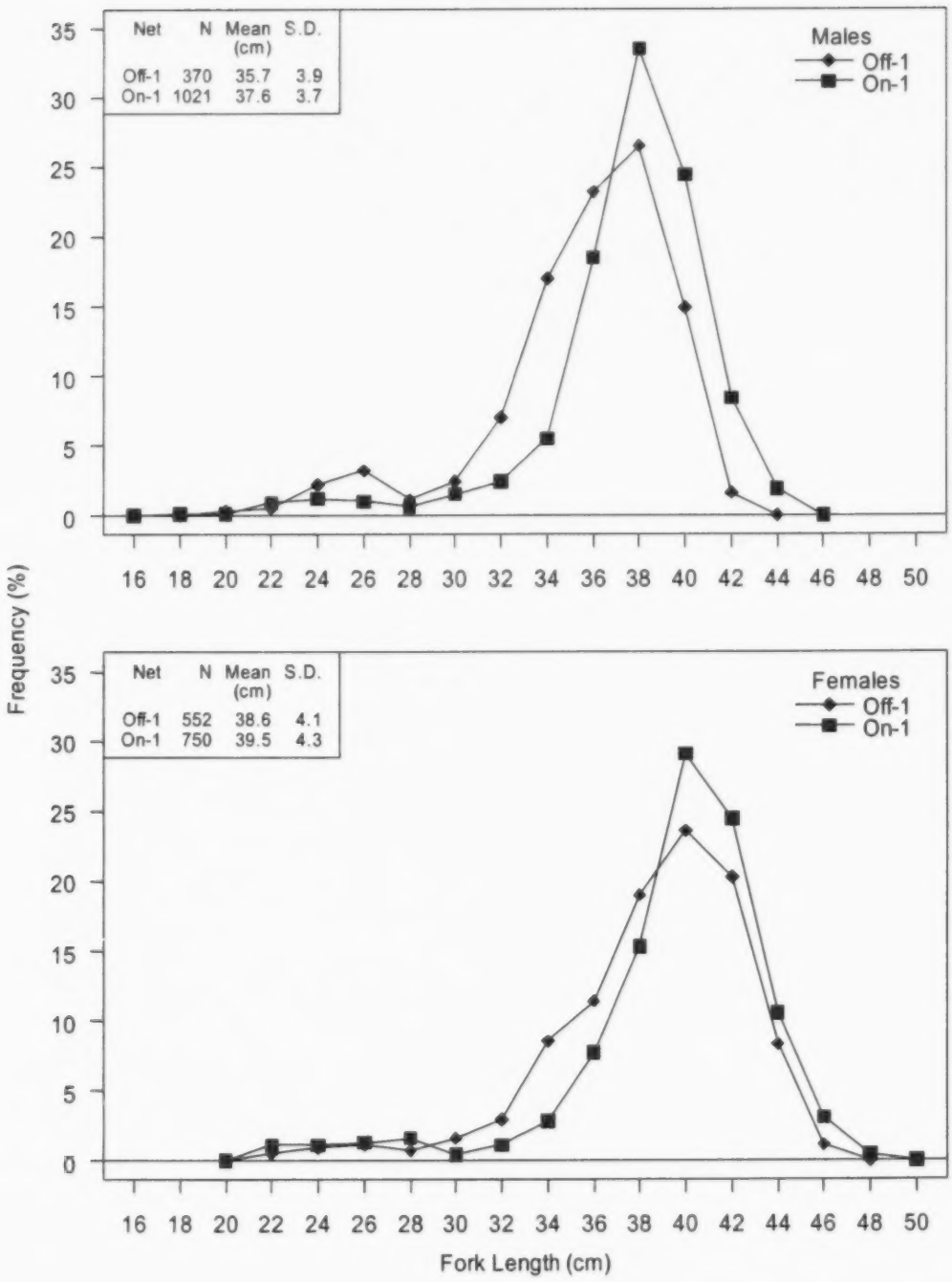


Figure 3. Length-frequencies (%) of male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-1) and on-bottom (On-1) trawls, at 140-159 fms, in western Goose Island Gully, September-October 1967 (Source: Tables 2 and 3)

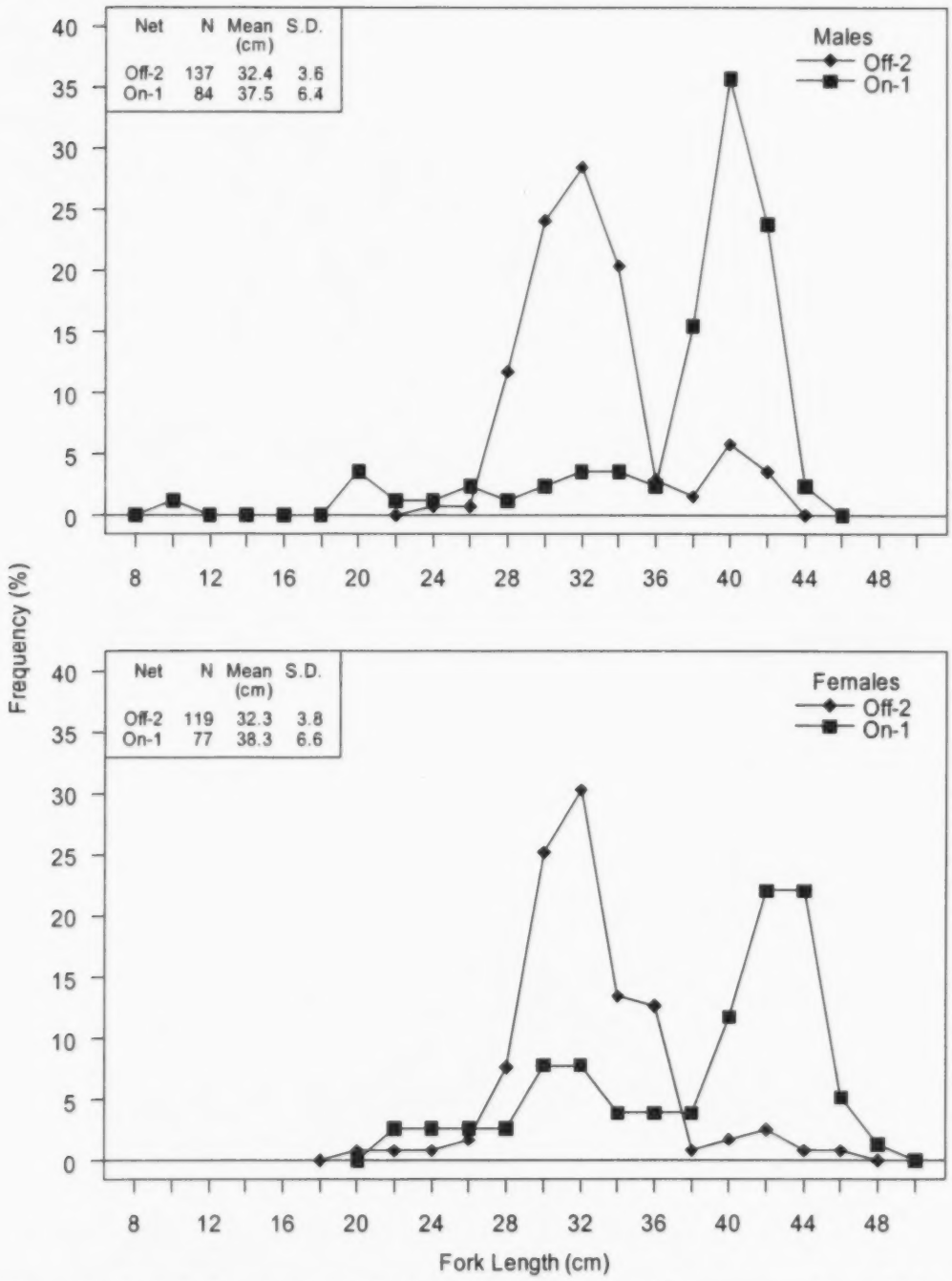


Figure 4a. Length-frequencies (%) of male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-2), and on-bottom (On-1), trawls, at 80-99 fms, in western Goose Island Gully, June 1970. (Source: Table 6)

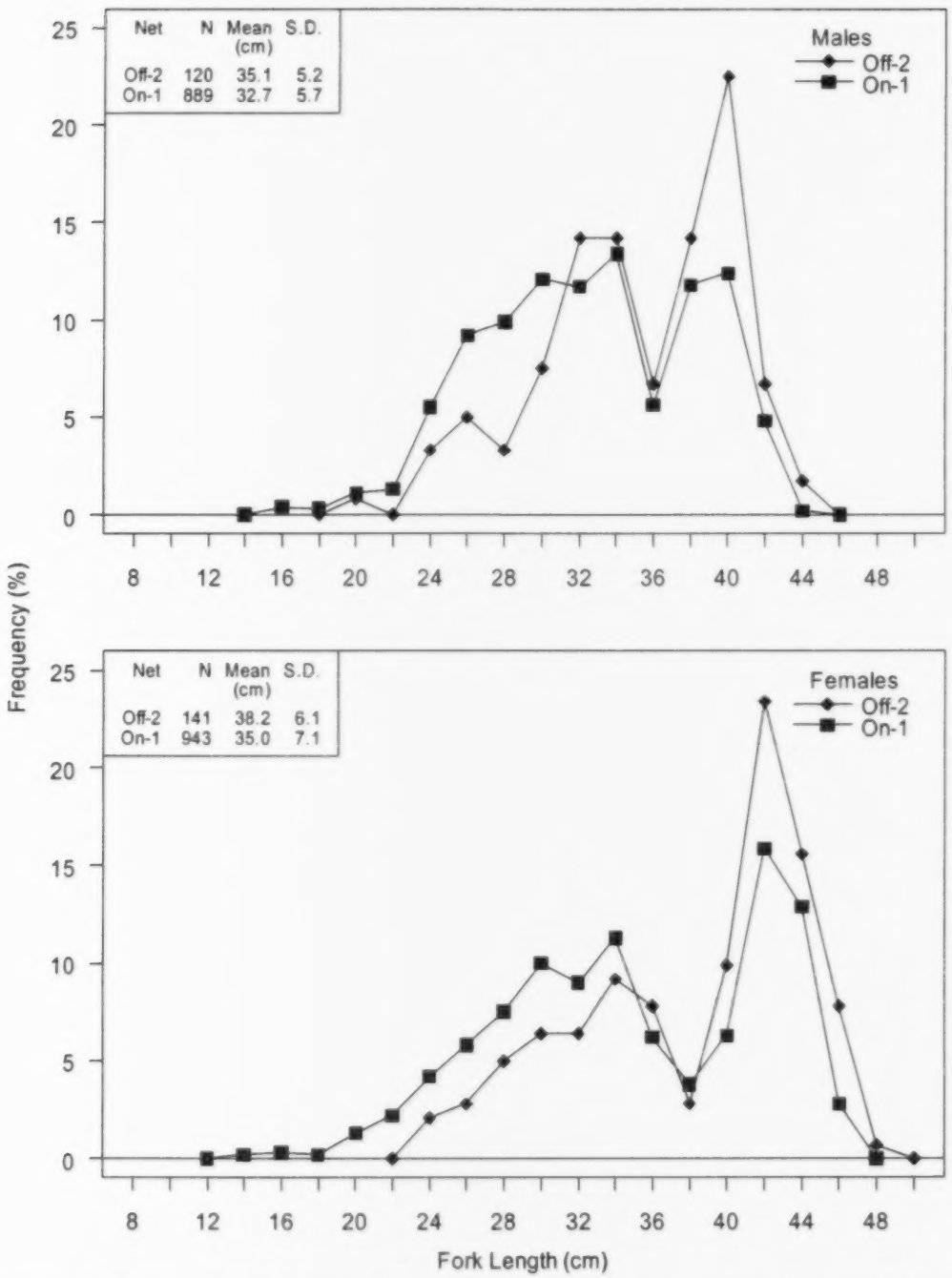


Figure 4b. Length-frequencies (%) of male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-2), and on-bottom (On-1), trawls, at 100-119 fms, in western Goose Island Gully, June 1970. (Source: Table 6)

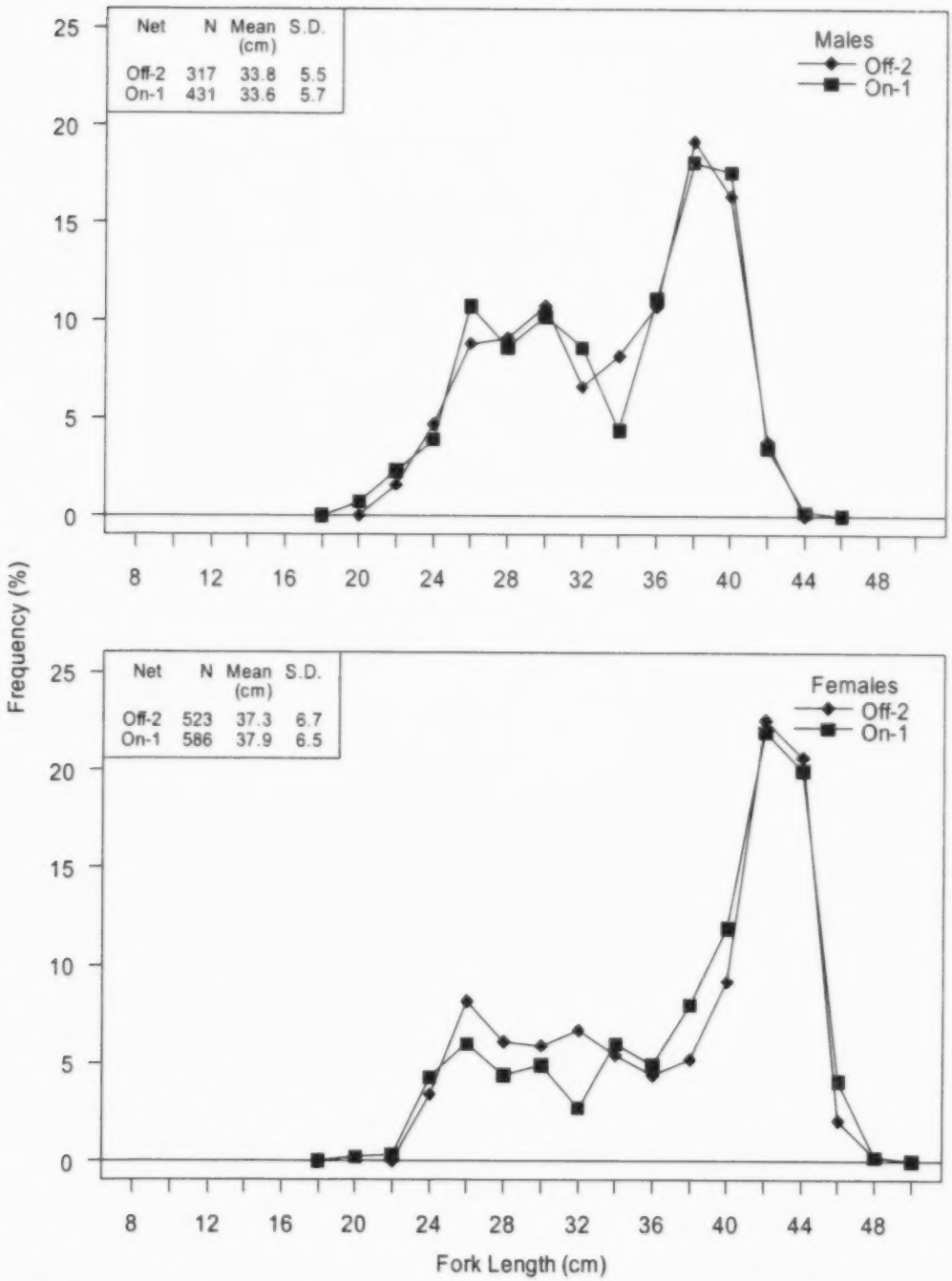


Figure 4c. Length-frequencies (%) of male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-2), and on-bottom (On-1), trawls, at 120-139 fms, in western Goose Island Gully, June 1970. (Source: Table 6)

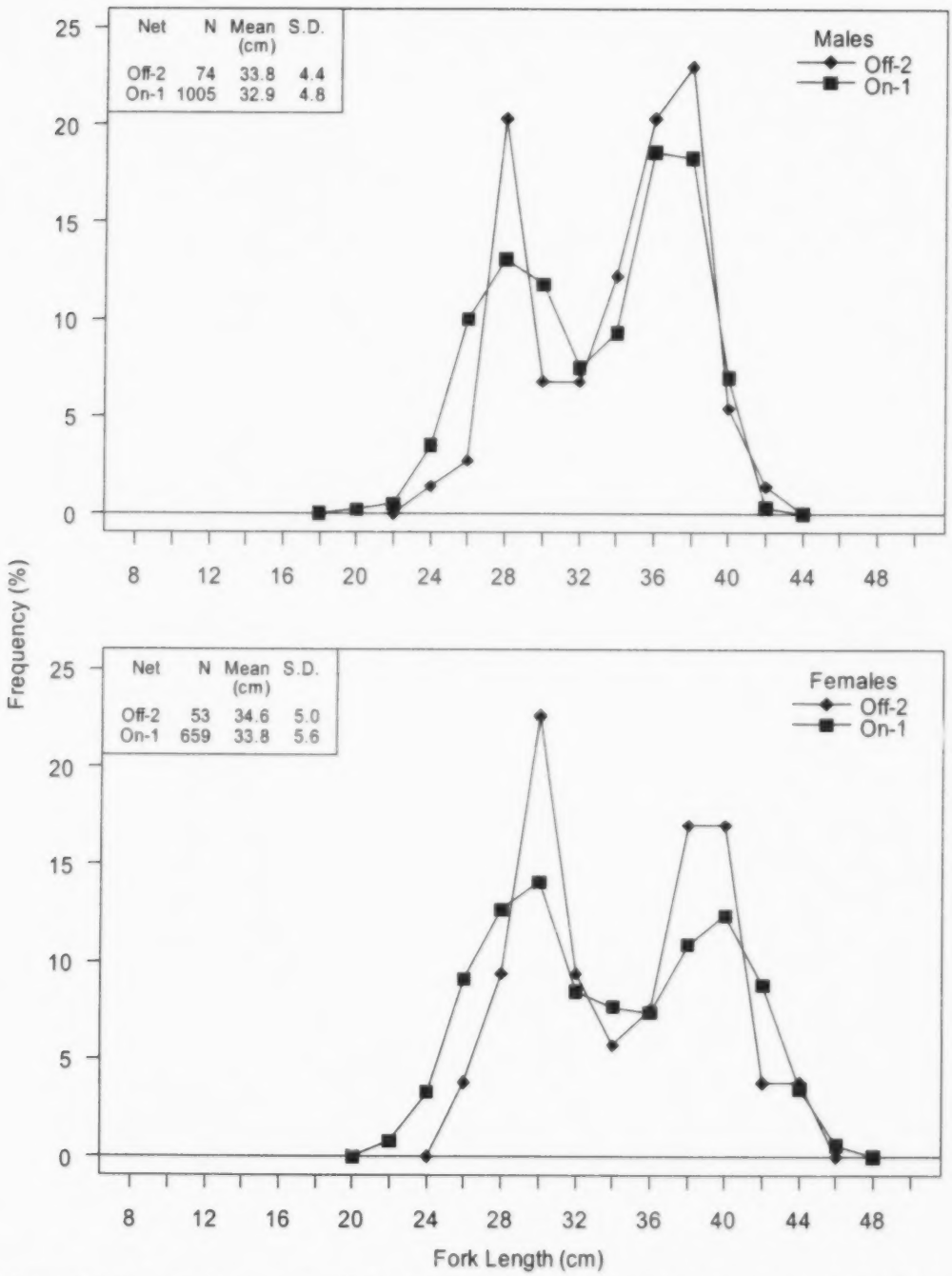


Figure 4d. Length-frequencies (%) of male and female Pacific ocean perch caught by the R/V *G.B. Reed* off-bottom (Off-2), and on-bottom (On-1), trawls, at 140-159 fms, in western Goose Island Gully, June 1970. (Source: Table 6)

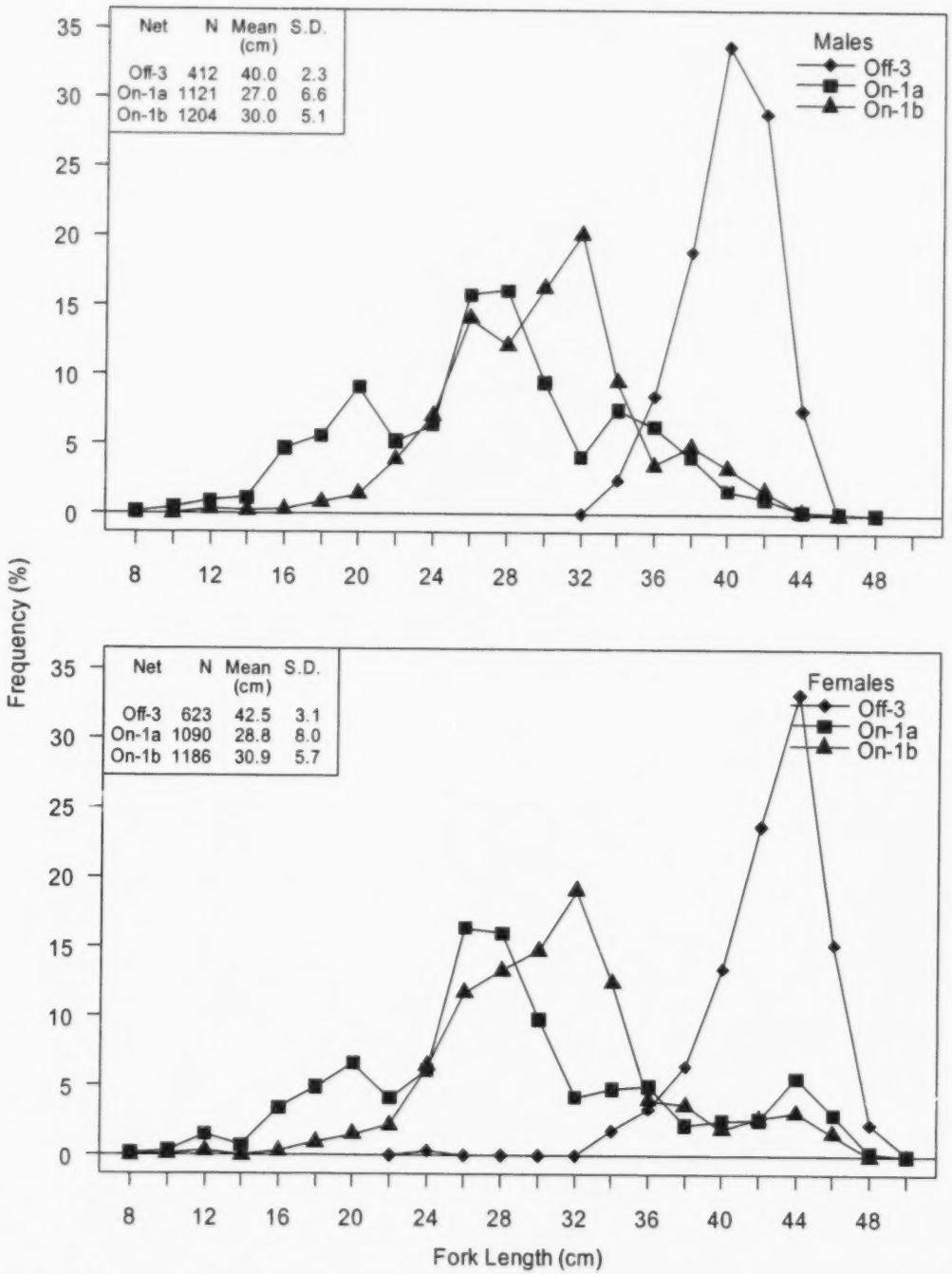


Figure 5. Length-frequencies (%) of male and female Pacific ocean perch caught by the F/V *Royal Canadian* off-bottom trawl (Off-3; August 1968), and the R/V.*G.B. Reed* on-bottom trawls (On-1a,b; September 1967, 1969), at 80-99 fm, in eastern Goose Island Gully. (Source: Table 7)

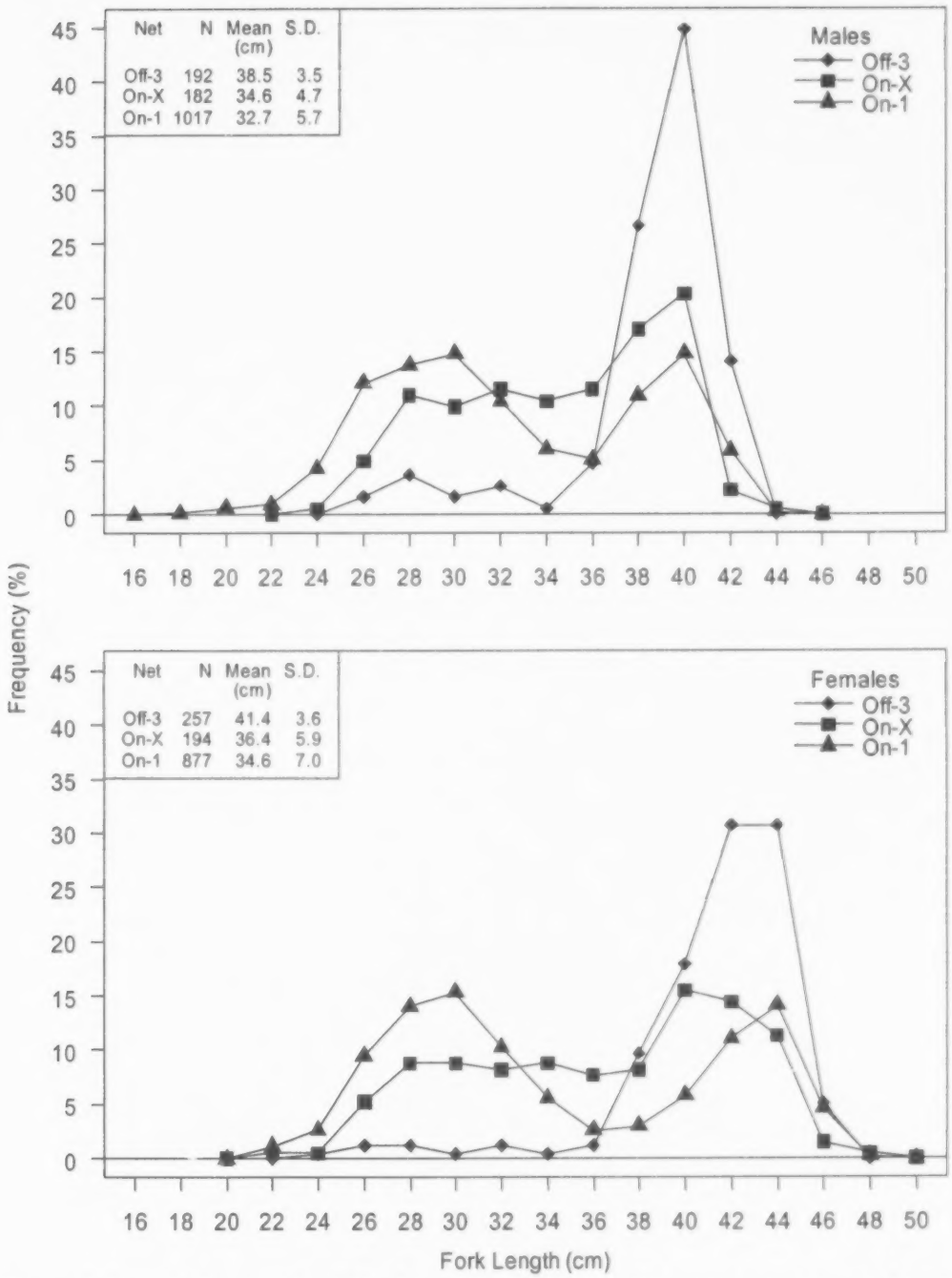


Figure 6. Length-frequencies (%) of male and female Pacific ocean perch caught by the F/V *Canadian No. 1* off-bottom (Off-3) trawl, the F/V *Royal Canadian* on-bottom (On-X) trawl, and the R/V *G.B. Reed* on-bottom (On-1) trawl, in northeast and southeast Goose Island Gully, June-July 1970. (Source: Table 8)

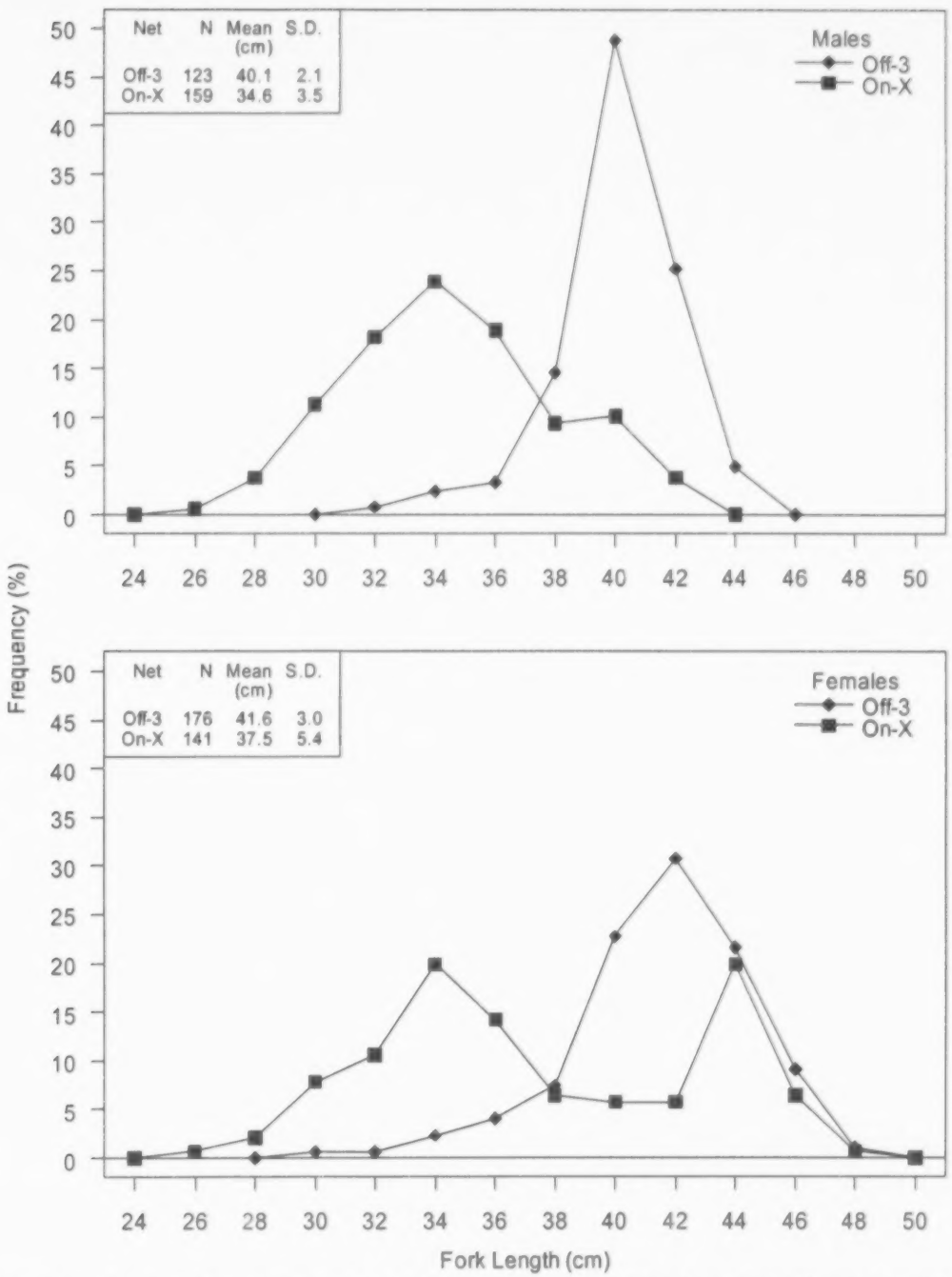


Figure 7. Length-frequencies (%), by 20-fm depth interval, of male and female Pacific ocean perch from off-bottom (Off-3) and on-bottom (On-X) trawl catches of the M/V *Royal Canadian* in Goose Island Gully, July 1971. (Source: Table 9)

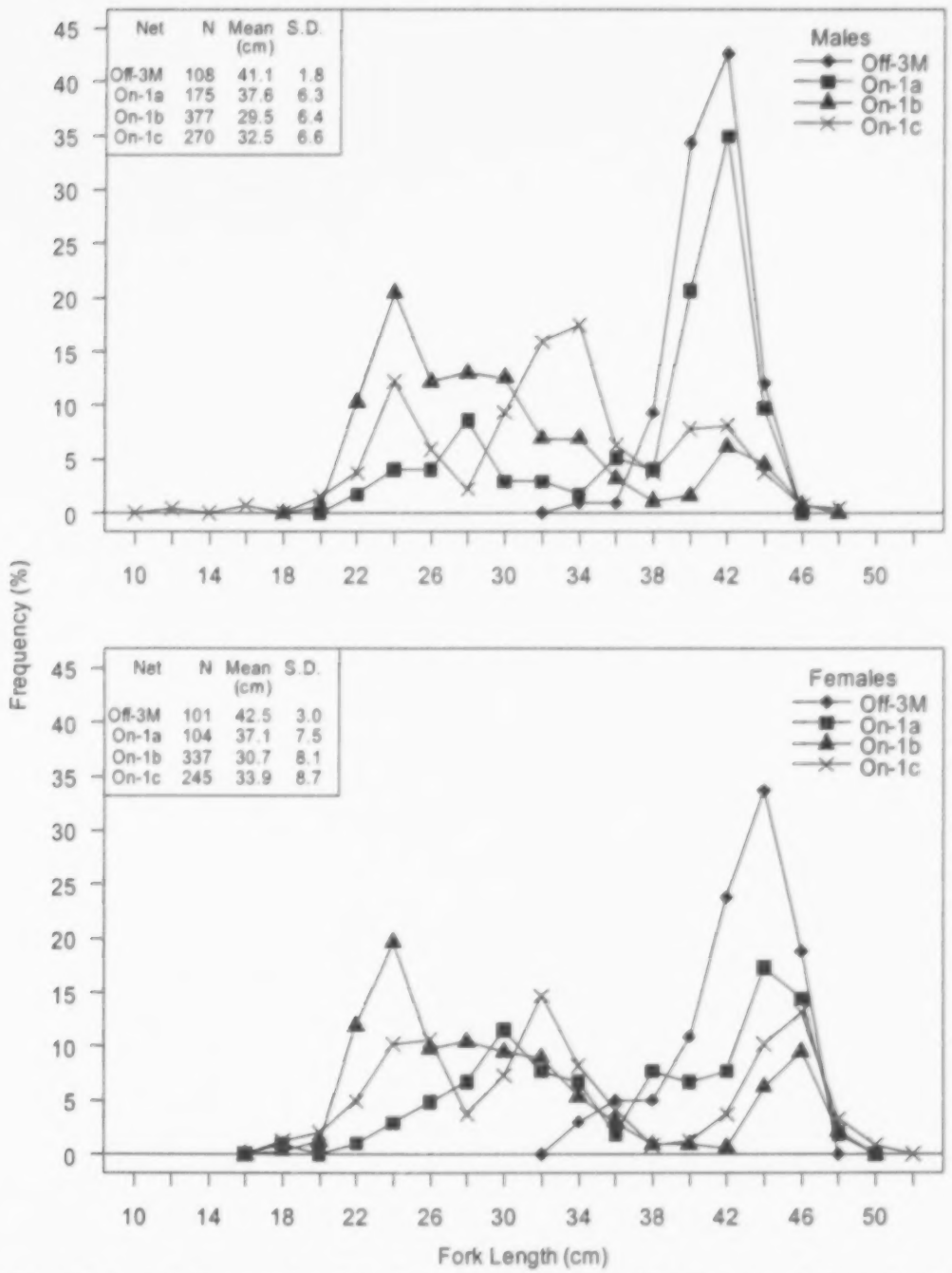


Figure 8. Length-frequencies (%) of male and female Pacific ocean perch from the R/V *G.B. Reed* off-bottom (Off-3M) trawl catches in July 1973), and on-bottom trawl catches in July 1973 (On-1a), September 1974 (On-1b), and September 1978 (On-1c), at 80-99 fms, in northern Moresby Gully. (Source: Table 10)

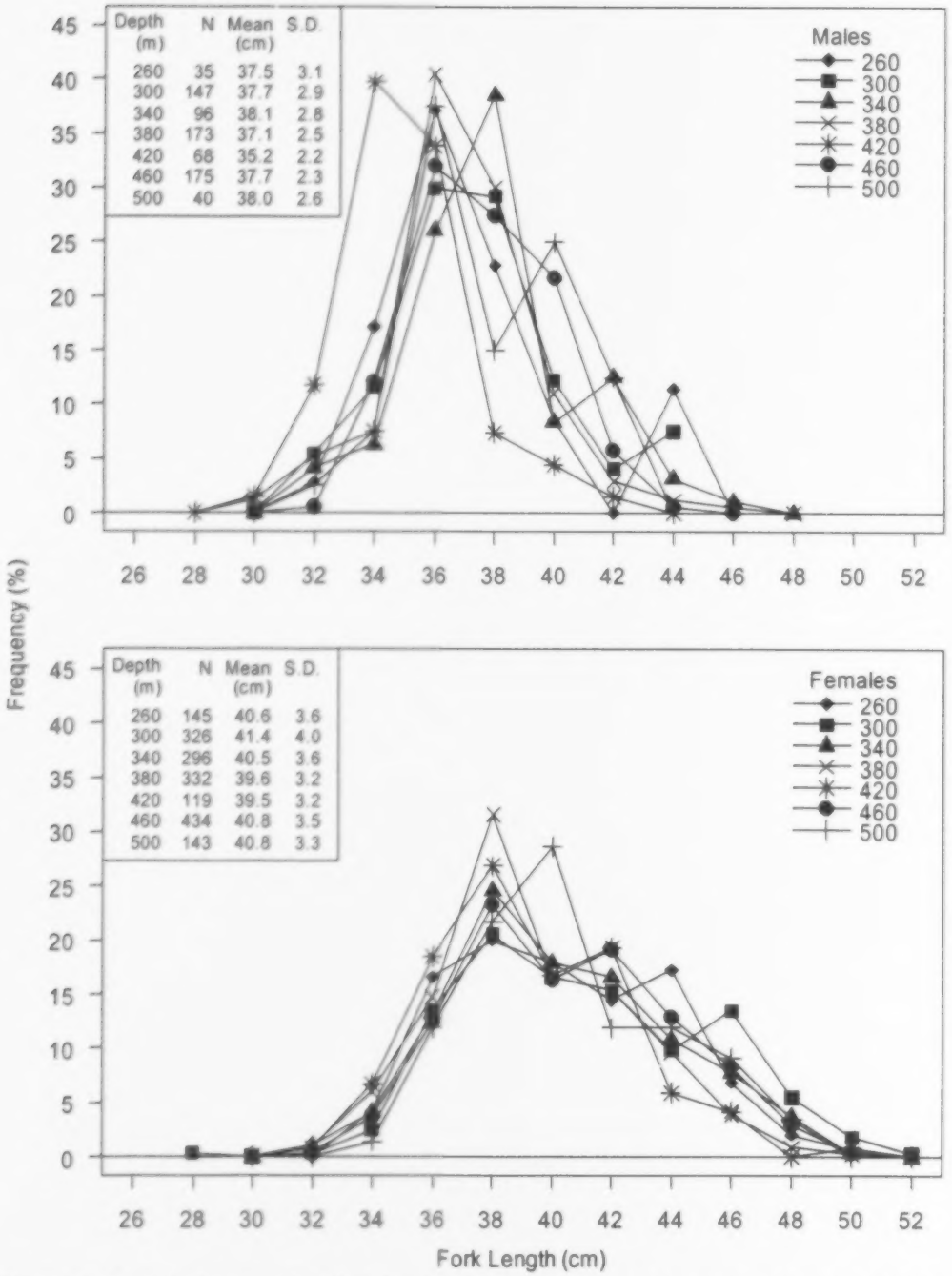


Figure 9. Length-frequencies (%), by 40-m depth interval, of male and female Pacific ocean perch caught by off-bottom (Off-X) trawls of foreign vessels in Area 3D, June-July 1989. (Source: Table 11)

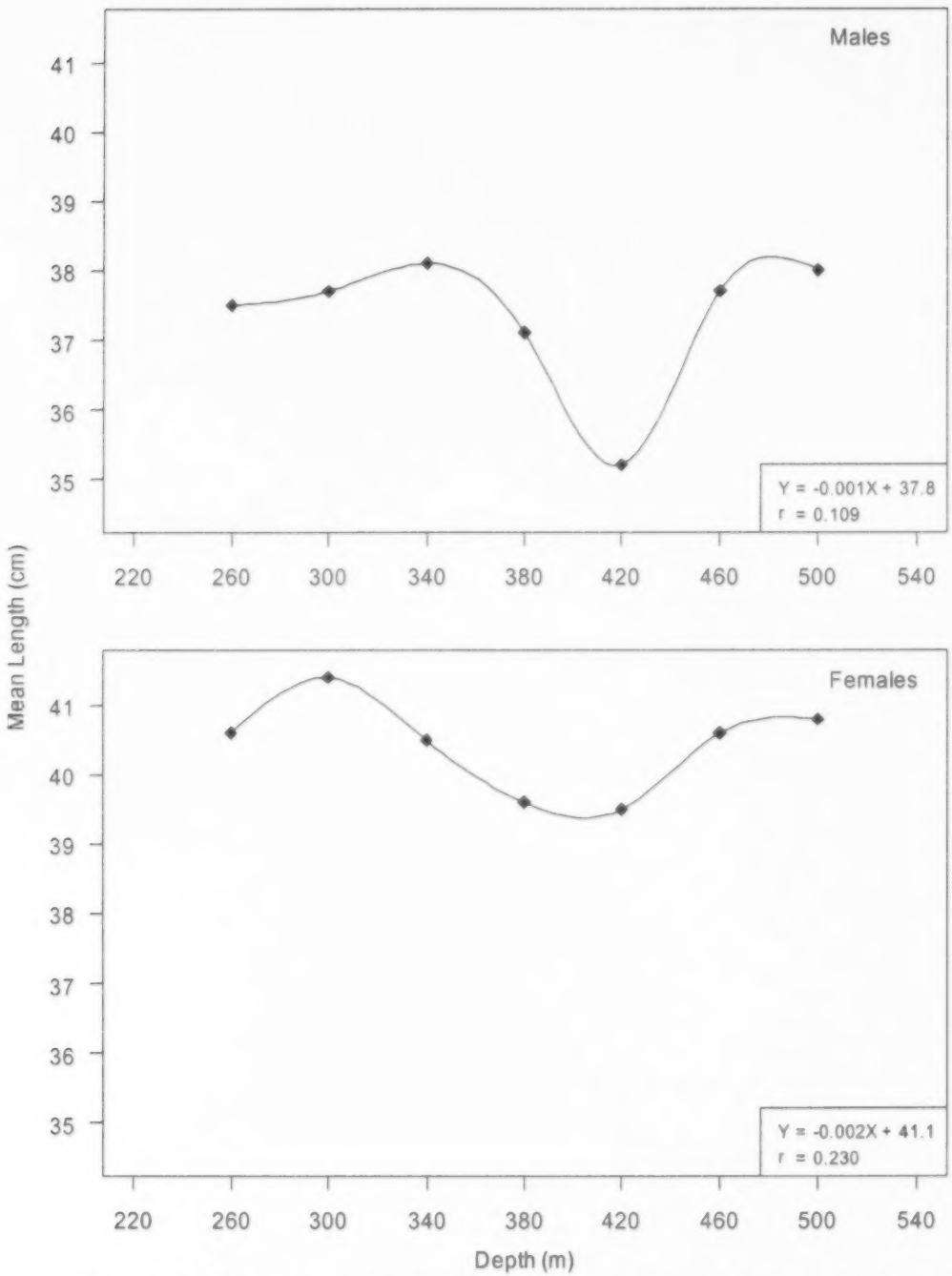


Figure 10. Relationship of mean length to depth, among 40-m depth intervals, for male and female Pacific ocean perch caught in off-bottom (Off-X) trawls of foreign vesseis in Area 3D, June-July 1989. (Source: Tables 11 and 12)

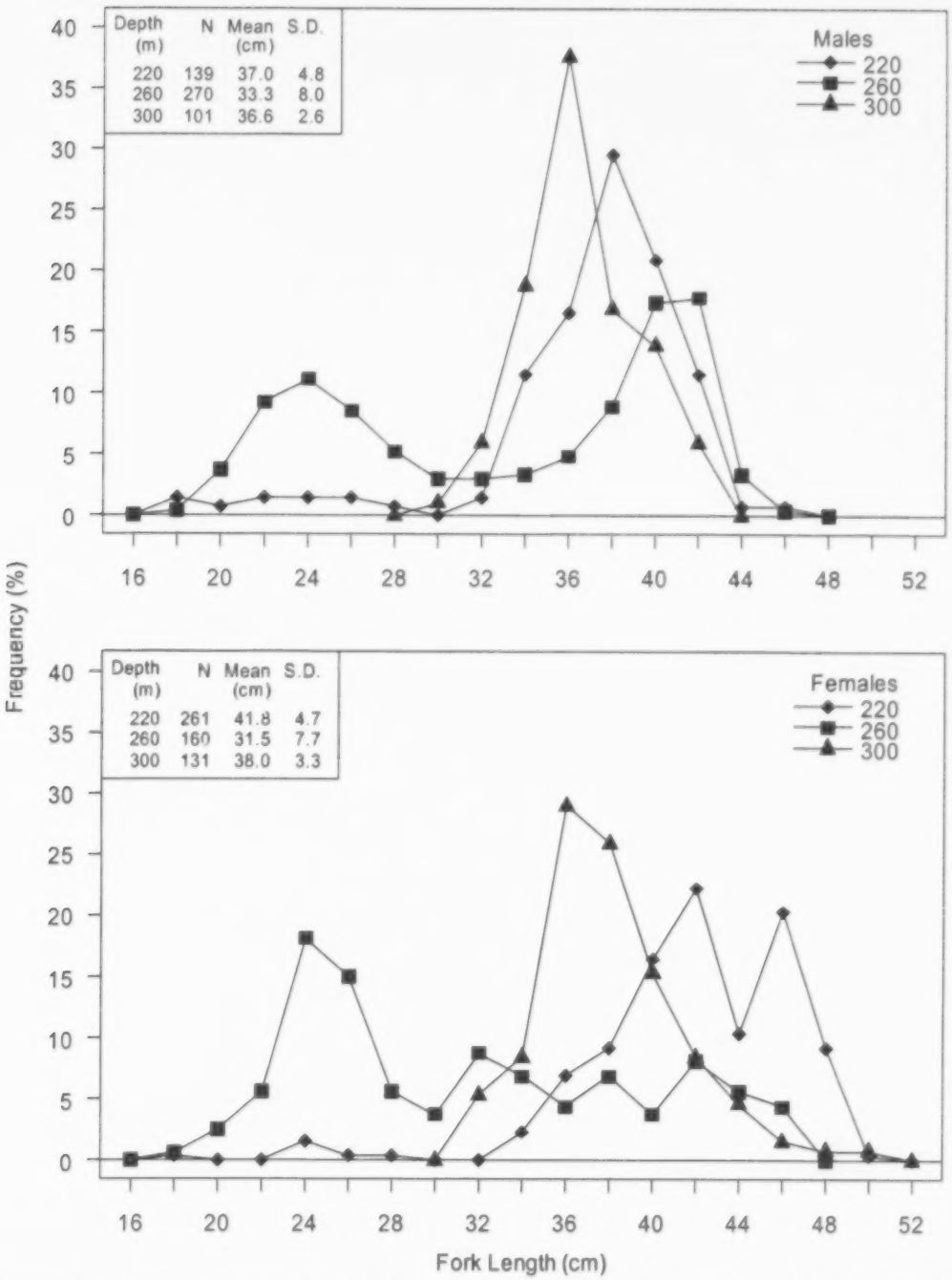


Figure 11. Length-frequencies (%), by 40-m depth interval, of male and female Pacific ocean perch caught by the F/V *Ocean Selector* on-bottom (On-Xa) trawl in Area 3D, July 1989. (Source: Table 14)

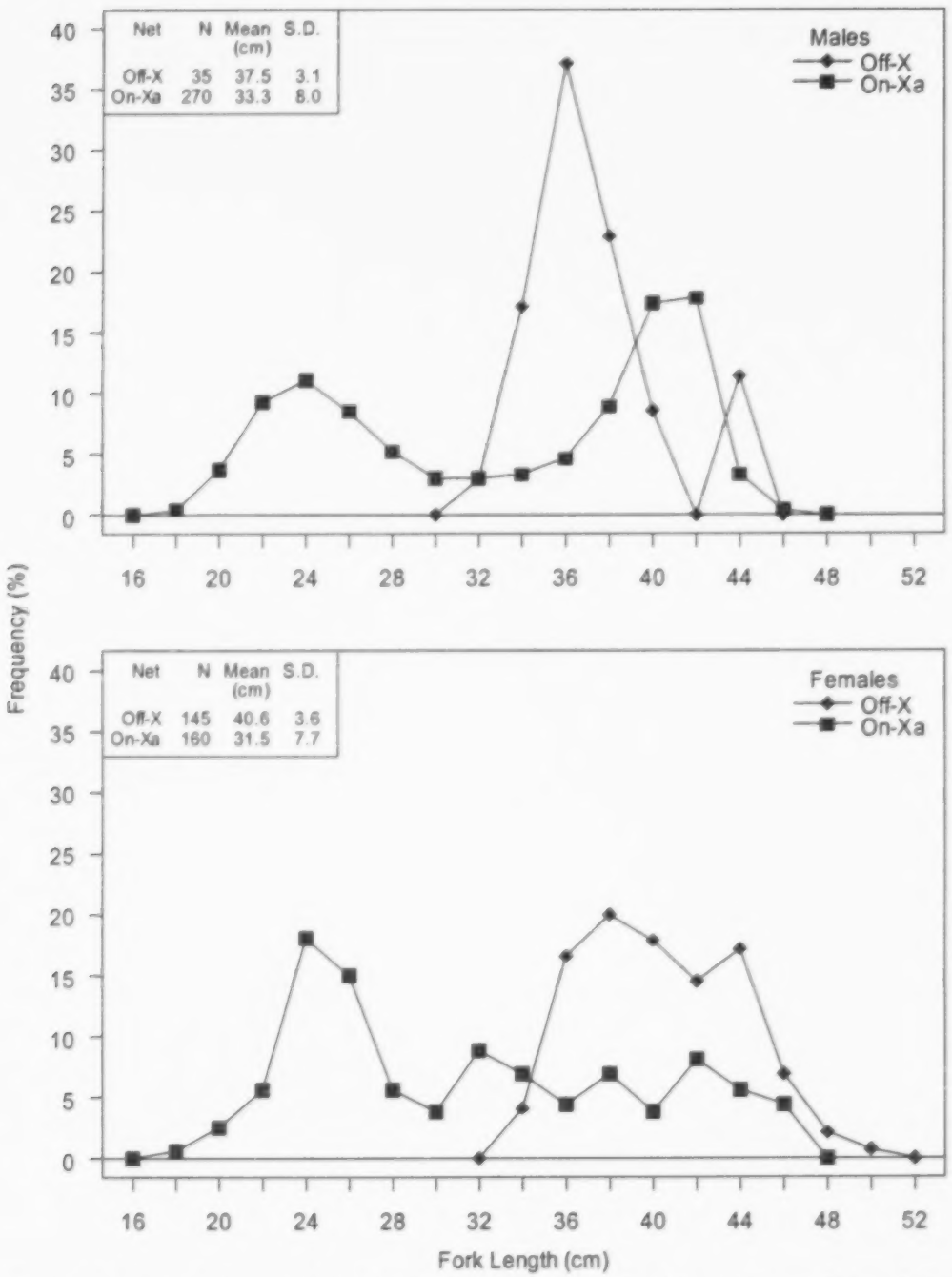


Figure 12a. Length frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xa) trawls in Area 3D, at 240-279 m, July-August 1989. (Source: Tables 11 and 14)

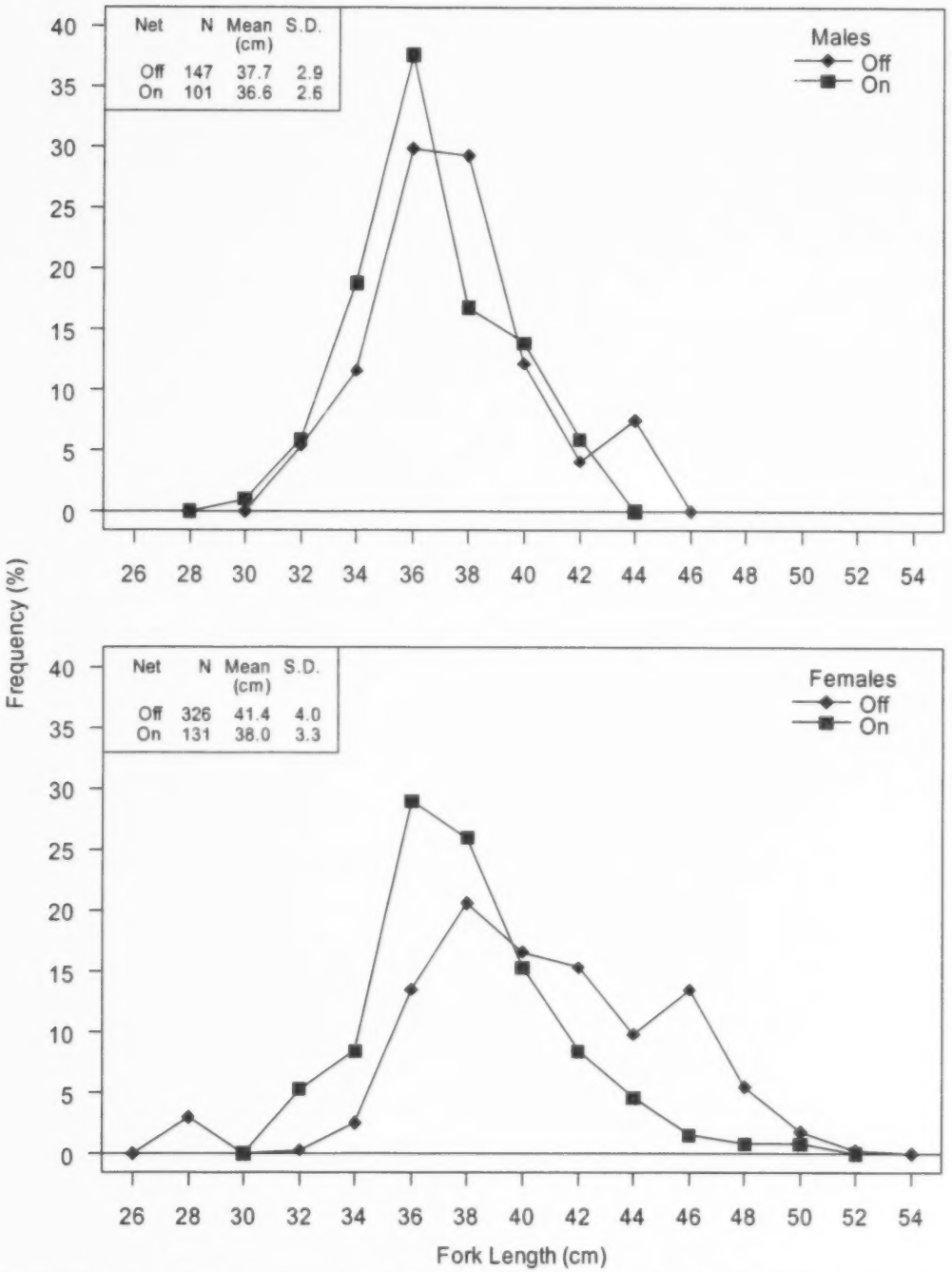


Figure 12b. Length frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xa) trawls in Area 3D, at 280-319 m, July-August 1989. (Source: Tables 11 and 14)

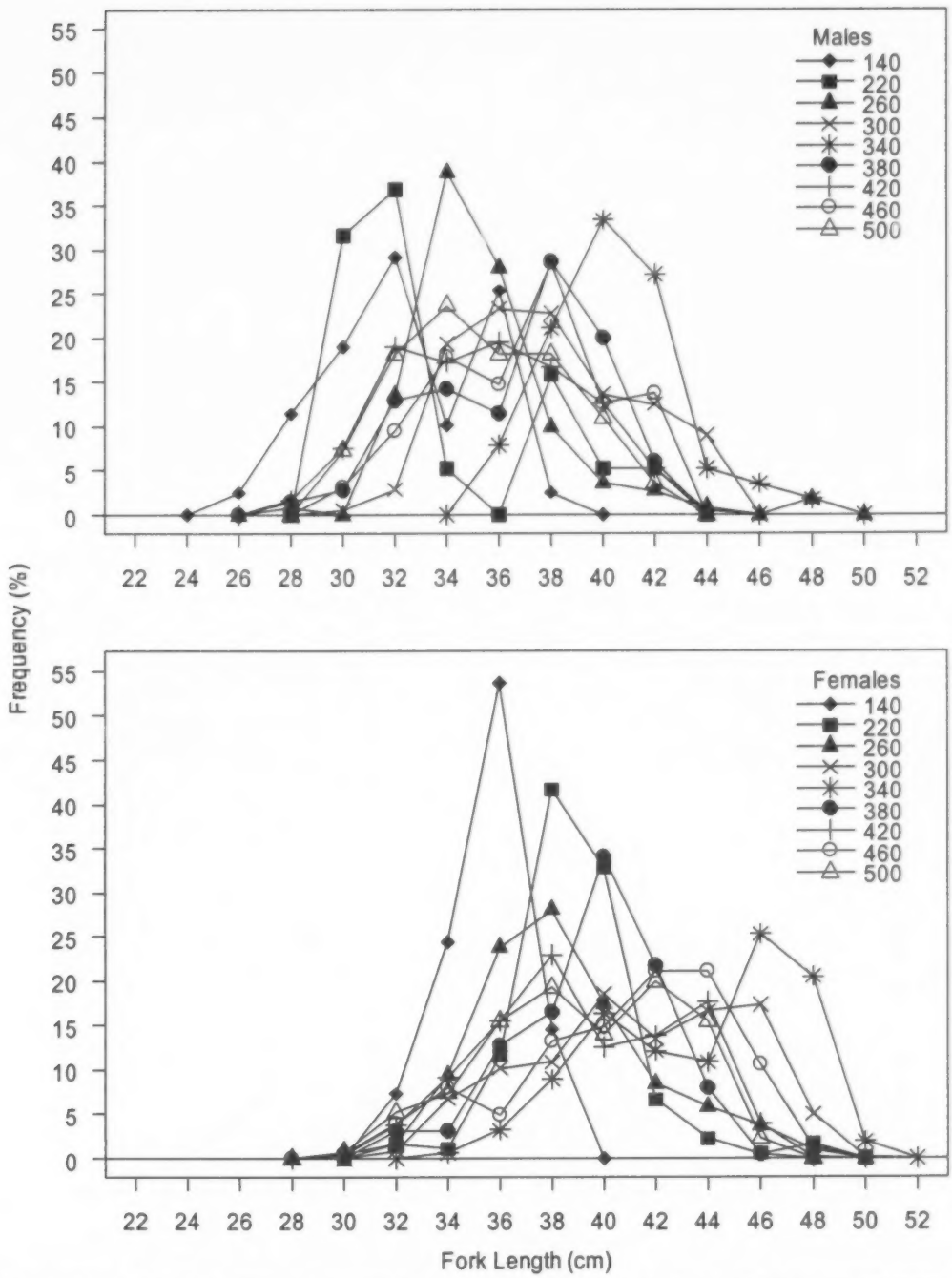


Figure 13. Length-frequencies (%), by 40-m depth interval, from off-bottom (Off-X) trawl catches of male and female Pacific ocean perch by foreign vessels in Area 3Cn, May-July 1988-89. (Source: Table 15)

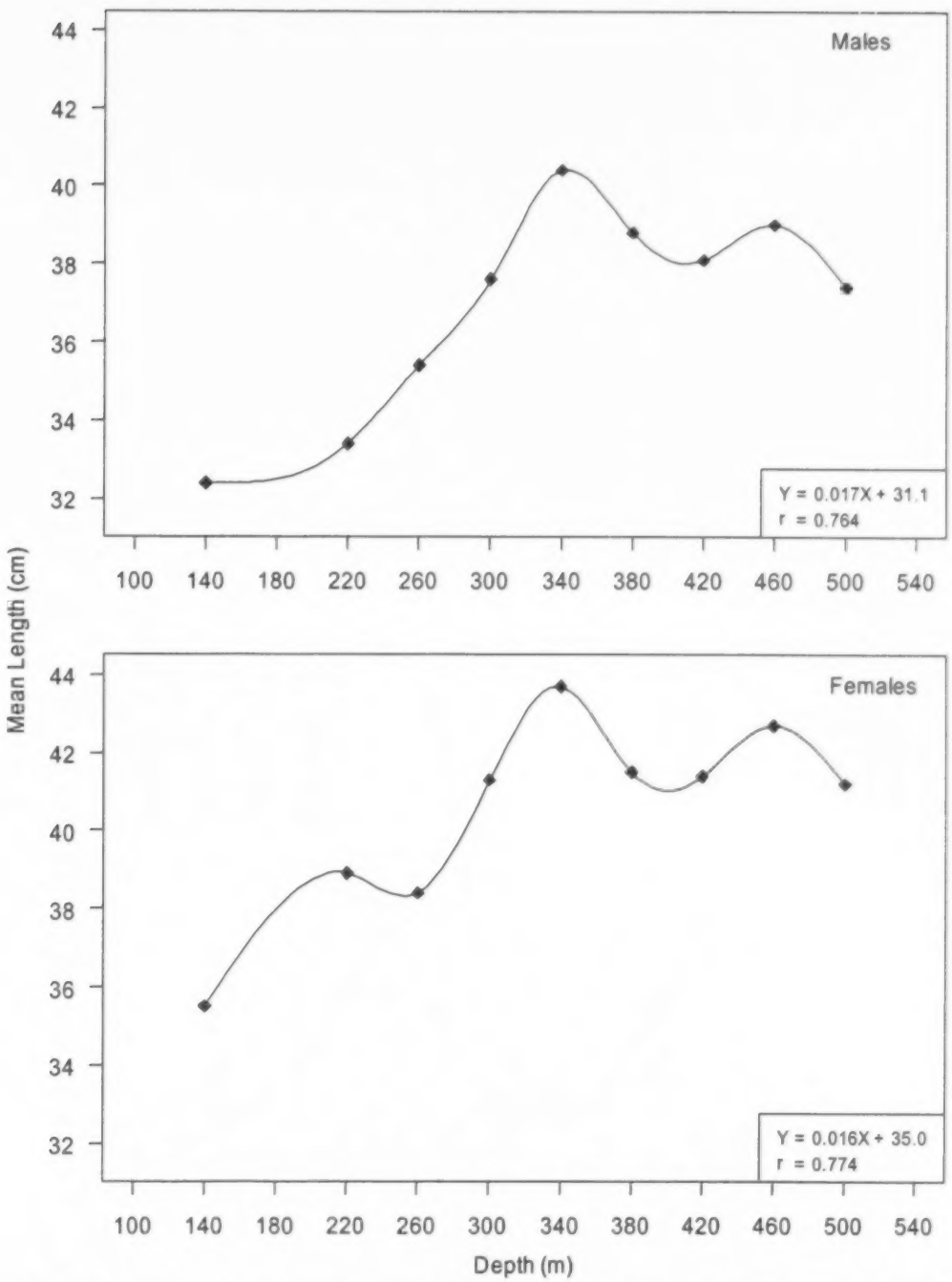


Figure 14. Relationship of mean length on depth, among 40-m depth intervals, for male and female Pacific ocean perch caught by off-bottom (Off-X) trawls of foreign vessels in Area 3Cn, May-July 1988-89. (Source: Tables 12 and 15)

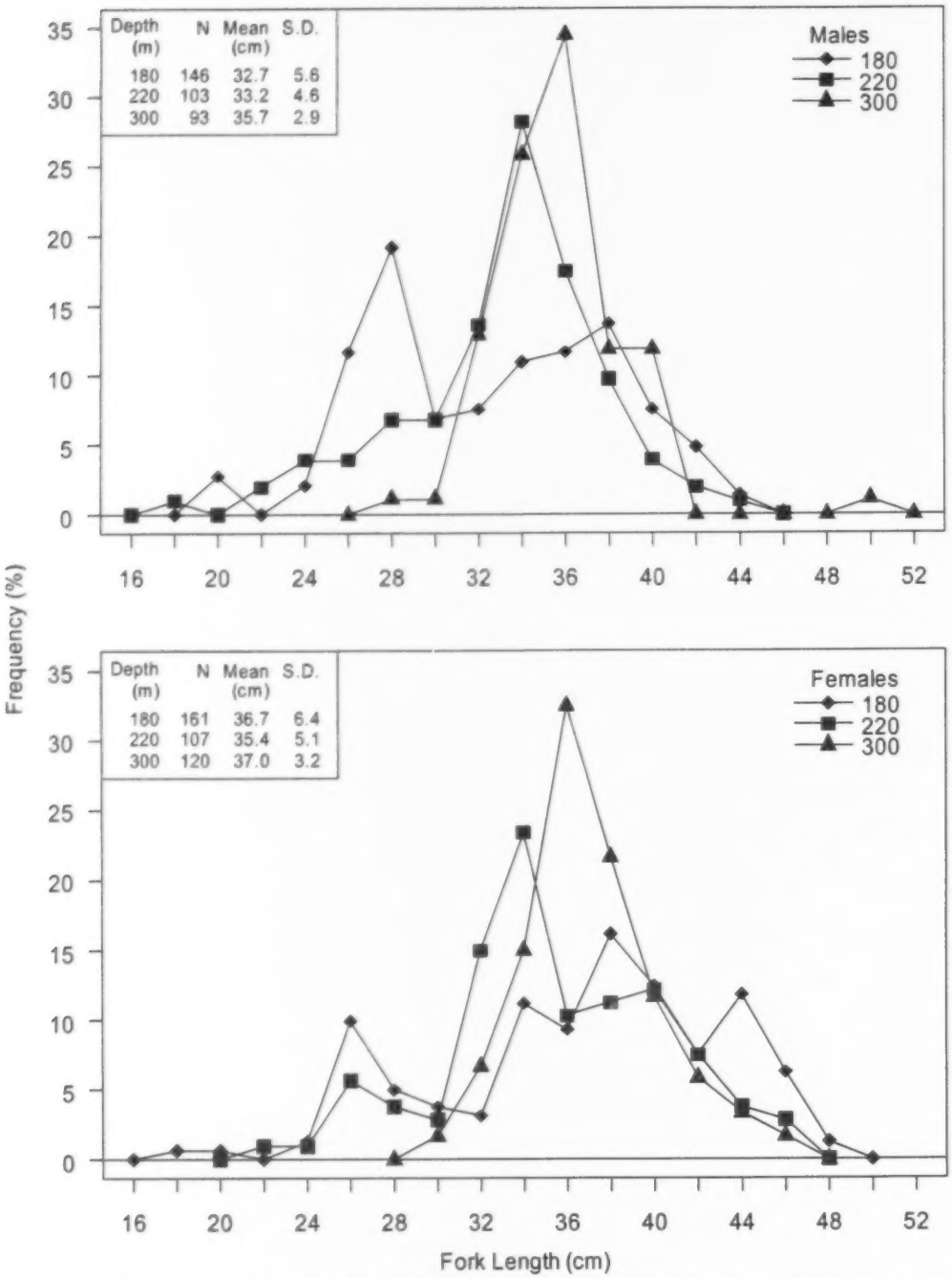


Figure 15. Length-frequencies (%), by 40-m depth interval, of male and female Pacific ocean perch caught by the F/V *Ocean Selector* on-bottom (On-Xa) trawl in Area 3Cn, July 1989. (Source: Table 16)

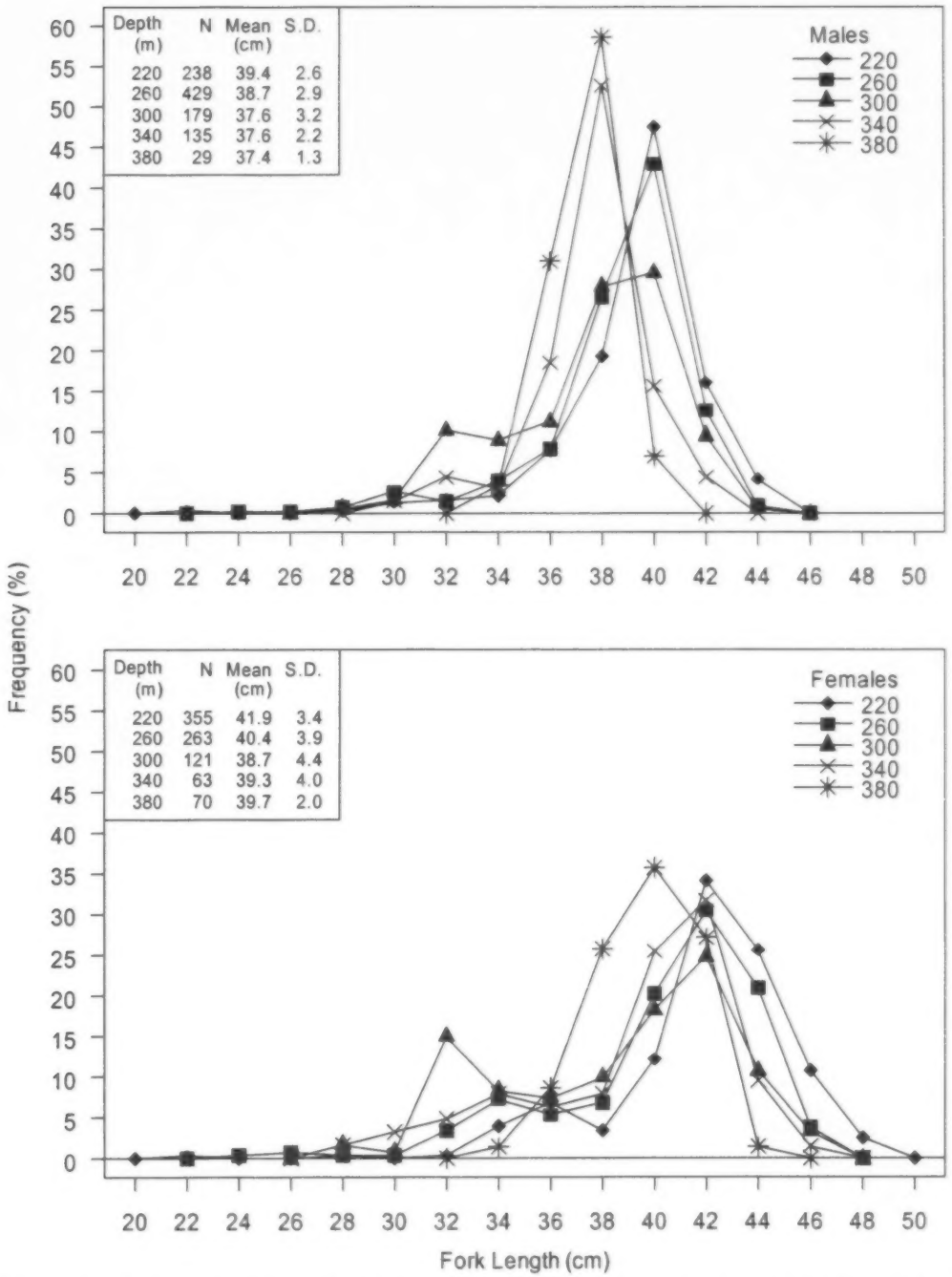


Figure 16. Length-frequencies (%), by 40-m depth interval, of male and female Pacific ocean perch caught by the F/V *Howe Bay* on-bottom (On-Xb) trawl in Area 3C (3Cn+3Cs), September 1985. (Source: Table 17)

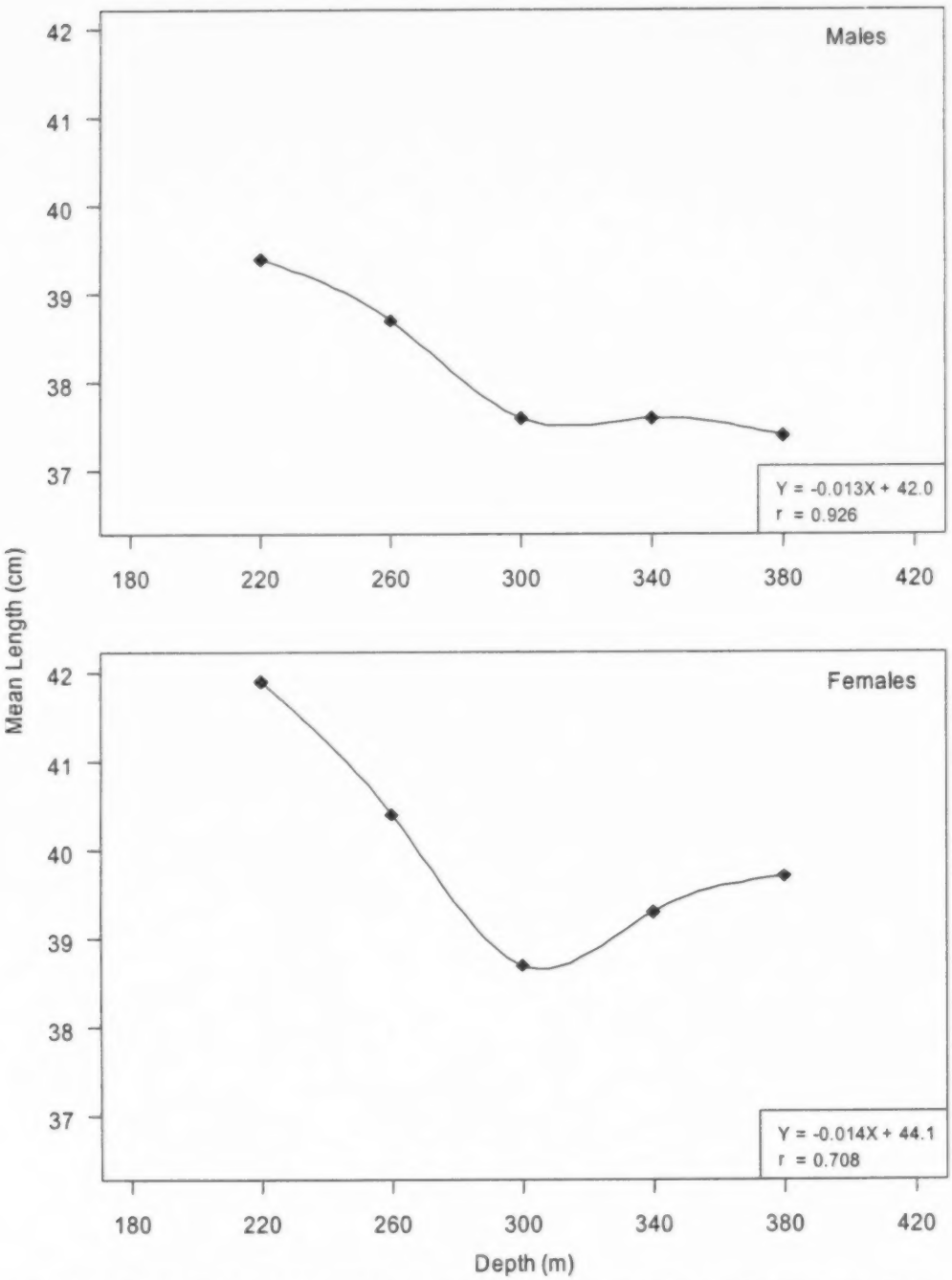


Figure 17. Relationship of mean length on depth, among 40-m depth intervals, for male and female Pacific ocean perch caught by the F/V *Howe Bay* on-bottom (On-Xb) trawl in Area 3C, September 1985. (Source: Tables 12 and 17)

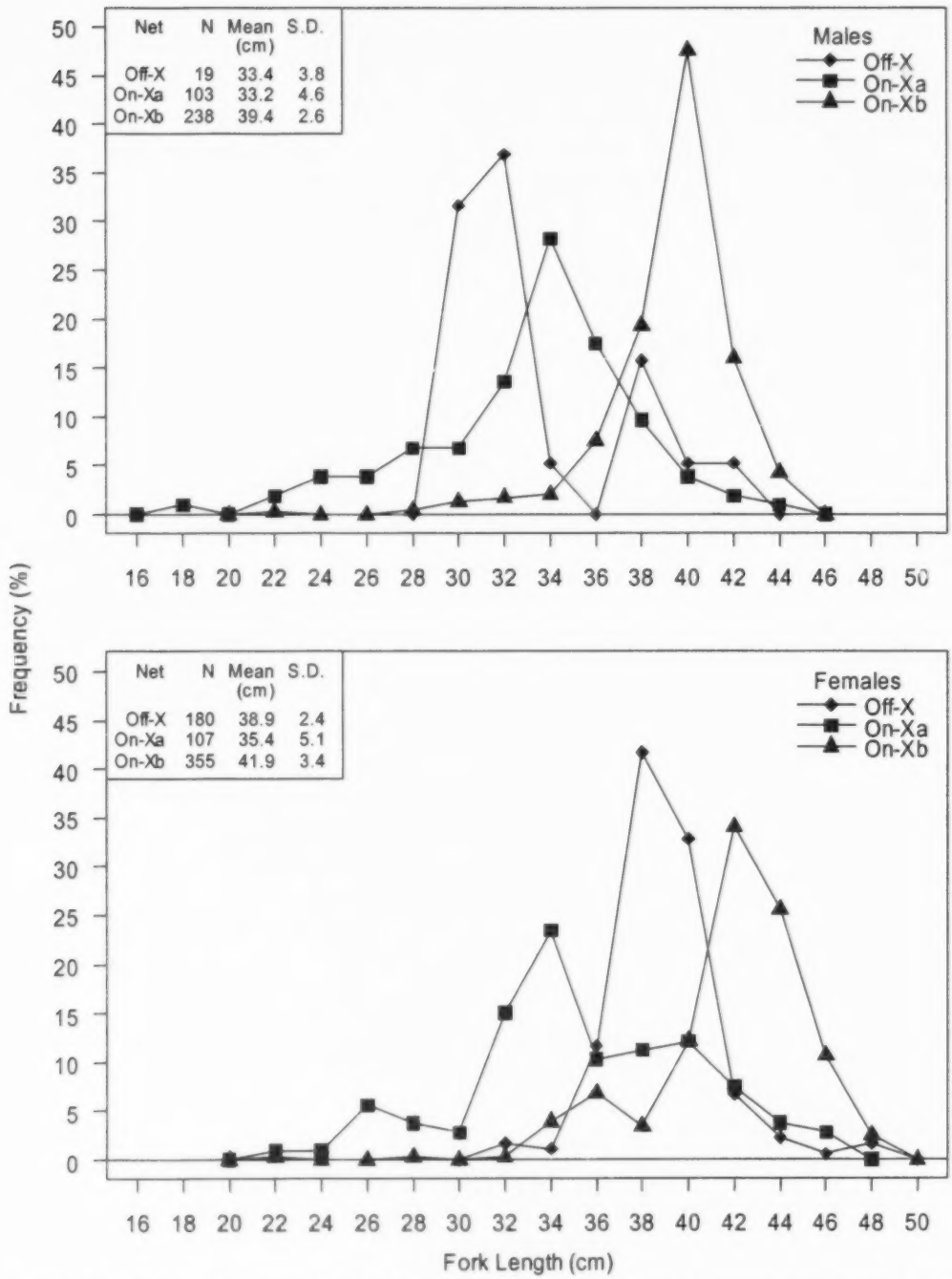


Figure 18a. Length-frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xa,b) trawls, at 200-239 m, in Area 3C, 1985-89. Note: Off-X = foreign vessels; On-Xa = F/V *Ocean Selector*; On-Xb = F/V *Howe Bay*. (Source: Tables 15-17)

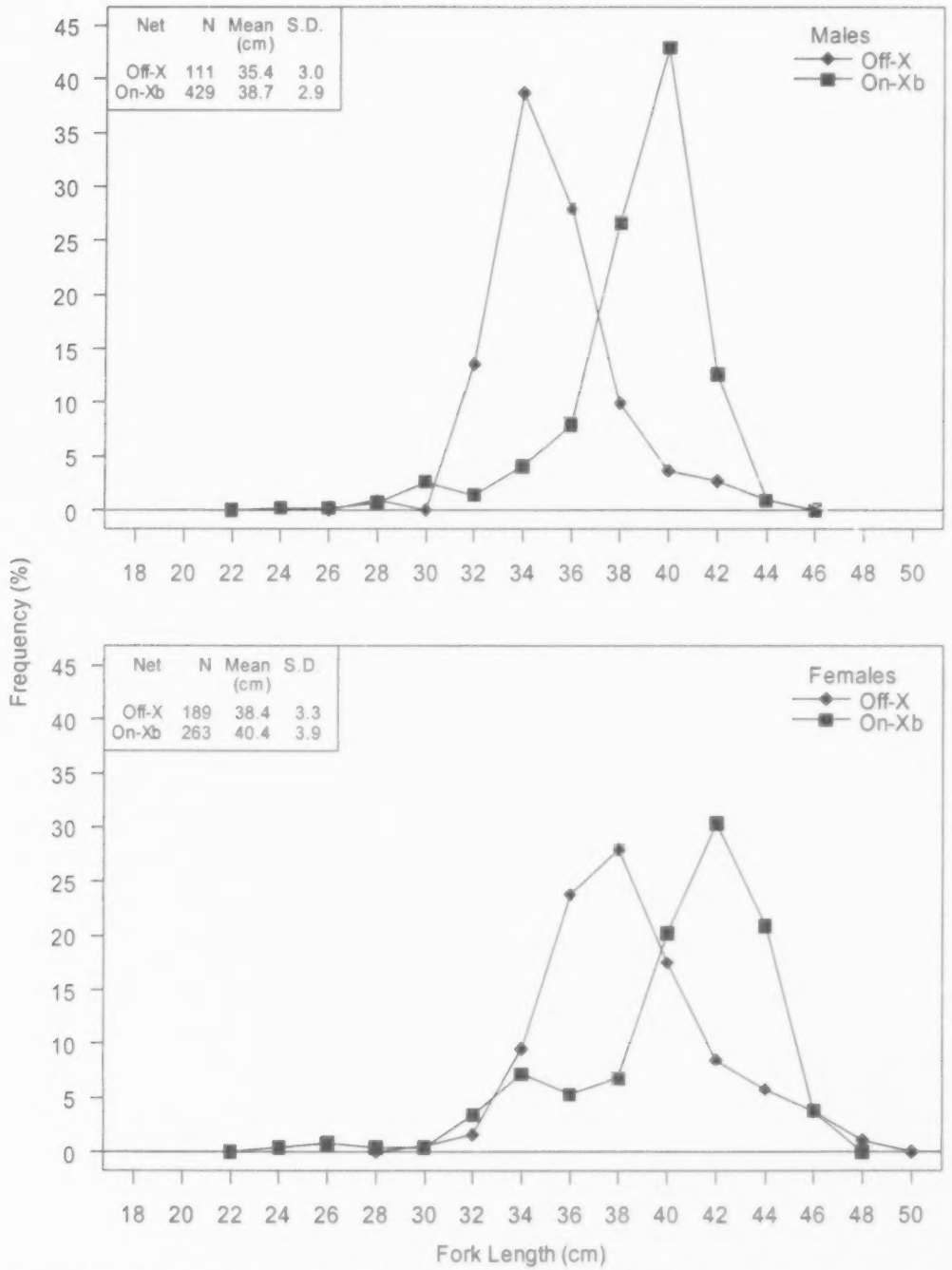


Figure 18b. Length-frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xb) trawls, at 240-279 m, in Area 3C, 1985-89. Note: Off-X = foreign vessels; On-Xb = F/V *Howe Bay*. (Source: Tables 15 and 17)

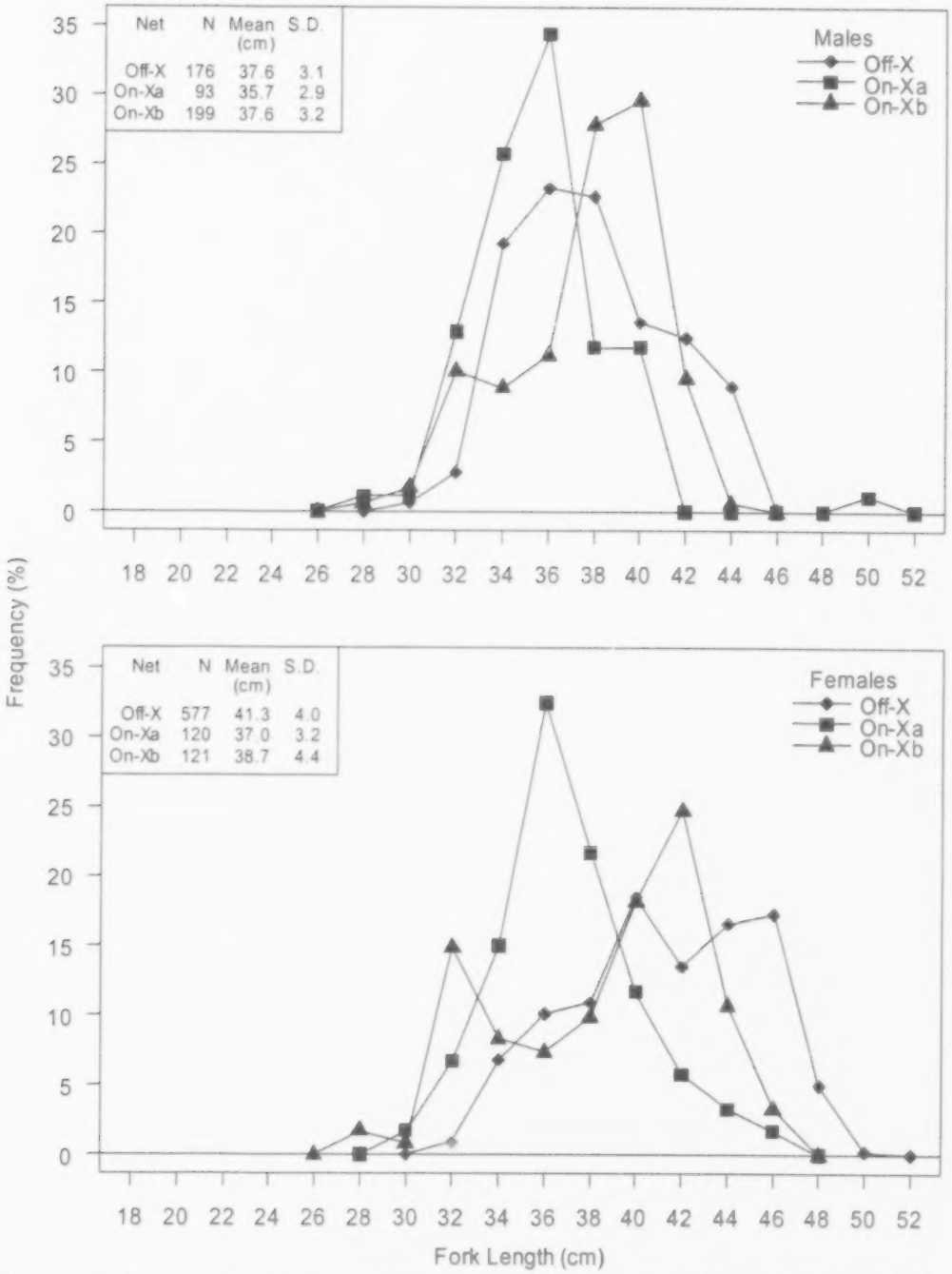


Figure 18c. Length-frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xb) trawls, at 280-319 m, in Area 3C, 1985-89. Note: Off-X = foreign vessels; On-Xa = F/V *Ocean Selector*; On-Xb = F/V *Howe Bay*. (Source: Tables 15-17)

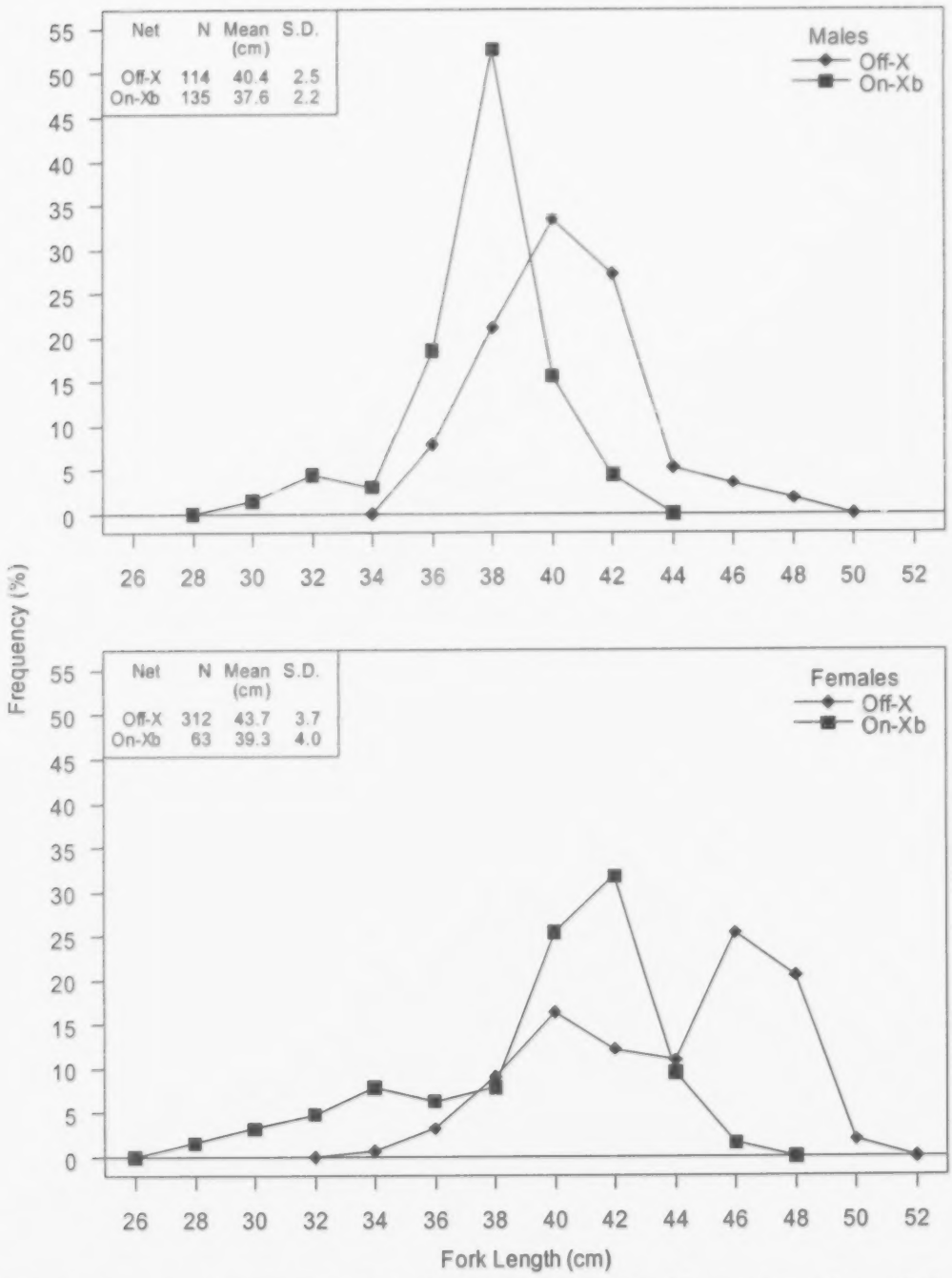


Figure 18d. Length-frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xb) trawls, at 320-359 m, in Area 3C, 1985-89. Note: Off-X = foreign vessels; On-Xb = F/V *Howe Bay*. (Source: Tables 15 and 17)

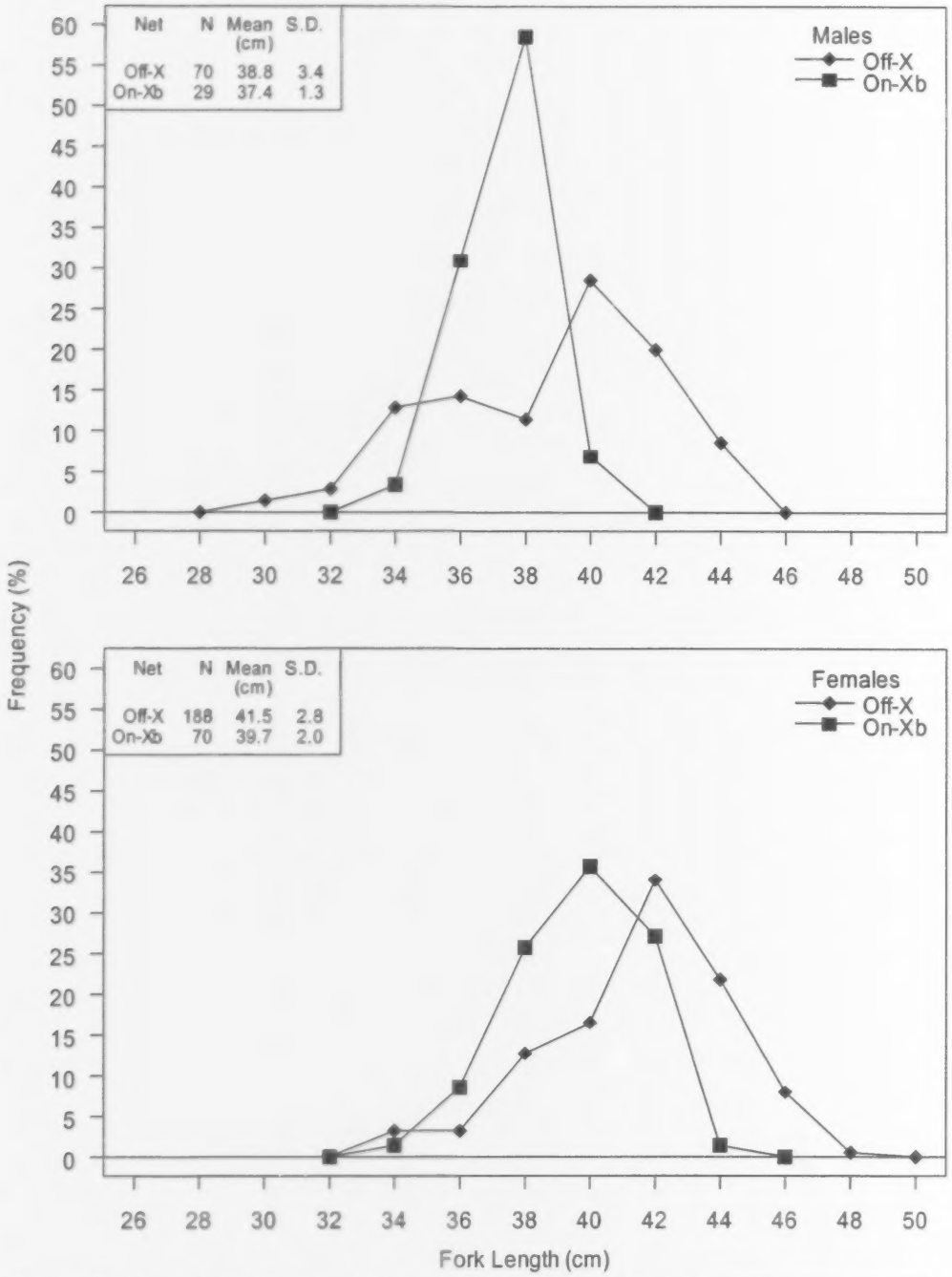
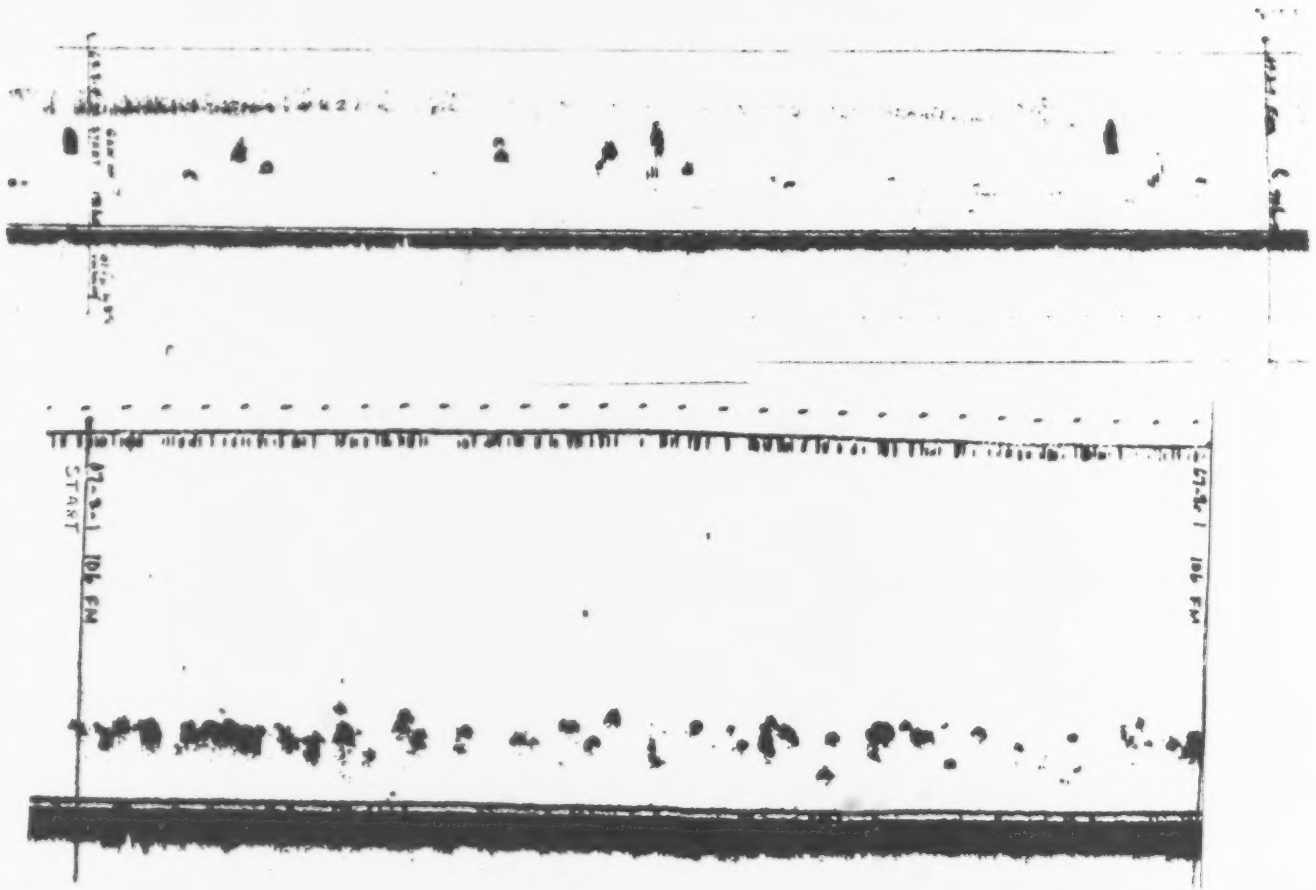


Figure 18e. Length-frequencies (%) of male and female Pacific ocean perch caught by off-bottom (Off-X) and on-bottom (On-Xb) trawls, at 360-399 m, in Area 3C, 1985-89. Note: Off-X = foreign vessels; On-Xb = F/V *Howe Bay*. (Source: Tables 15 and 17)

Echo Table 1. Index to echograms of selected R/V G.B. Reed trawl hauls in the Queen Charlotte Sound-Hecate Strait Region, 1967-73. (Sources: PBS Scientific Archives).

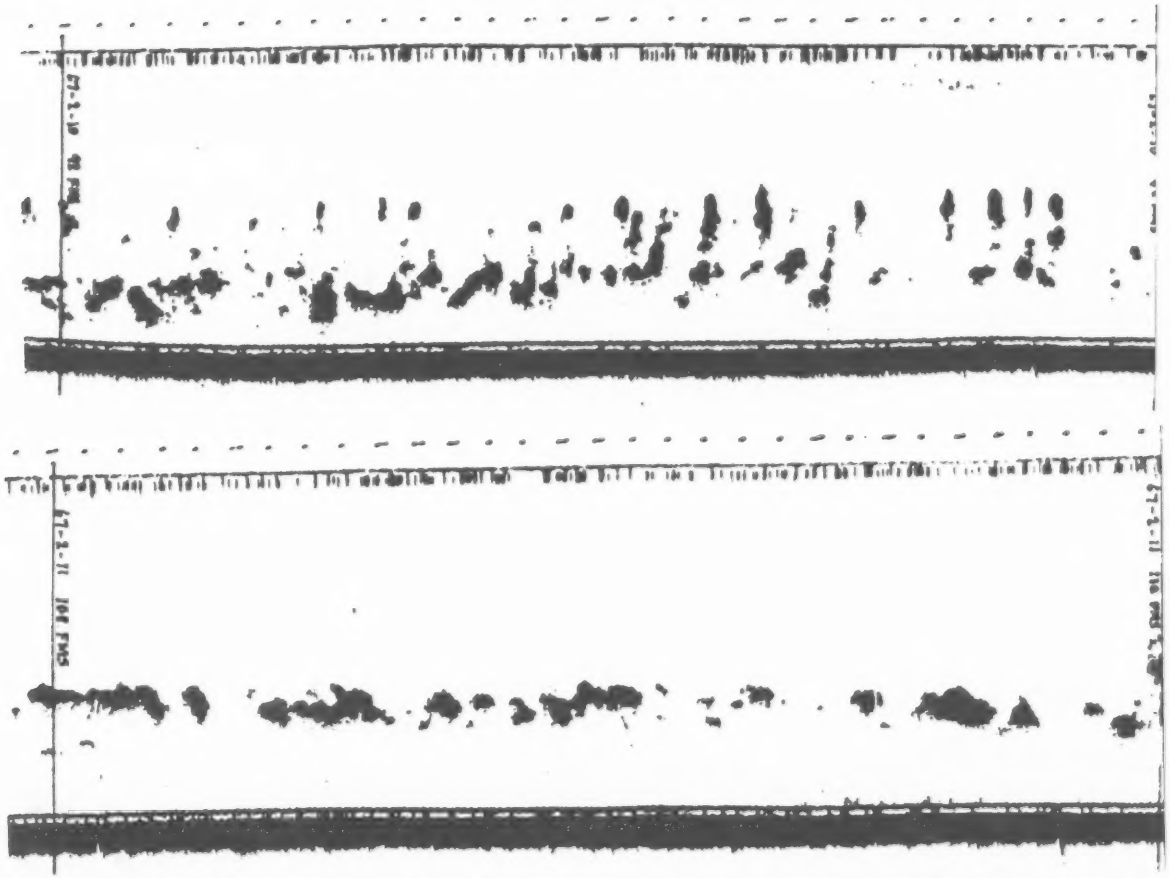
Figure	Echo	Loc.[a]	Haul[b]	Archive	Start time (PDT)	Net[c]	Depth[d] (fms)	Depth[d] (m)	Catch Total (lbs)	Catch POP (lbs)	Catch %POP	Catch Other[e] (lbs)	Catch Other[e] (spp)[f]
1	1	SE GIG	69-3-4	GQ/2/2	1034	On-1	90	165	1034	818	79	42	arrowtooth flounder
	2	SE GIG	67-2-1	GQ/2/1	1248	On-1	110	201	2682	1088	41	630	arrowtooth flounder
2	3	NE GIG	67-2-10	GQ/2/1	0722	On-1	90	165	2286	415	18	1135	arrowtooth flounder
	4	NE GIG	67-2-11	GQ/2/1	0910	On-1	110	201	12959	1553	12	7913	arrowtooth flounder
3	5	NW GIG	70-1-72	GQ/2/3	1048	On-1	90	165	1933	282	15	978	*S. reedi*
	6	NW GIG	70-1-79	GQ/2/3	1034	On-1	110	201	1422	178	13	849	*S. proriger*
4	7	SWSGIB	70-1-94	GQ/2/3	1055	Off-2	90	165	6480	0	0	3382	*S. proriger*
	8	E MiG	73-2-34	GQ/2/17	1337	On-1	110	201	1040	56	5	762	*S. zacentrus*
5	9	N MoG	73-1-34	GQ/2/11	1229	On-1	90	165	12383	4763	38	5692	Pacific pollock
	10	N MoG	73-1-54	GQ/2/11	1520	Off-3M	90	165	95	27	28	38	*S. brevispinis*

a. Location: GIG = Goose Island Gully; MiG = Mitchell's Gully; MoG = Moresby Gully; SWSGIB = S.W. Slope Goose Island Bank.
b. Haul: Year-cruise-haul. Cruise sources: 67-2, Westrheim et al. (1968); 69-3, Harling et al. (1969); 70-1, Harling et al. (1970); 73-1, Westrheim et al. (1973); 73-2, Harling et al. (1973)
c. Net: On-1 = on-bottom trawl; Off-2 = Universal Mark II off-bottom trawl; Off-3M = modified Engel off-bottom trawl.
d. Depth: Mid-points of 20-fm depth intervals. Equivalent values in meters.
e. Other: Largest catch other than Pacific ocean perch (POP).
f. Species: Arrowtooth flounder (*Atheresthes stomias*); Pacific pollock (*Theragra chalcogramma*; *S. brevispinis* (silvergray rockfish); *S. proriger* (redstripe rockfish); *S. reedi* (yellowmouth rockfish); *S. zacentrus* (sharpchin rockfish)



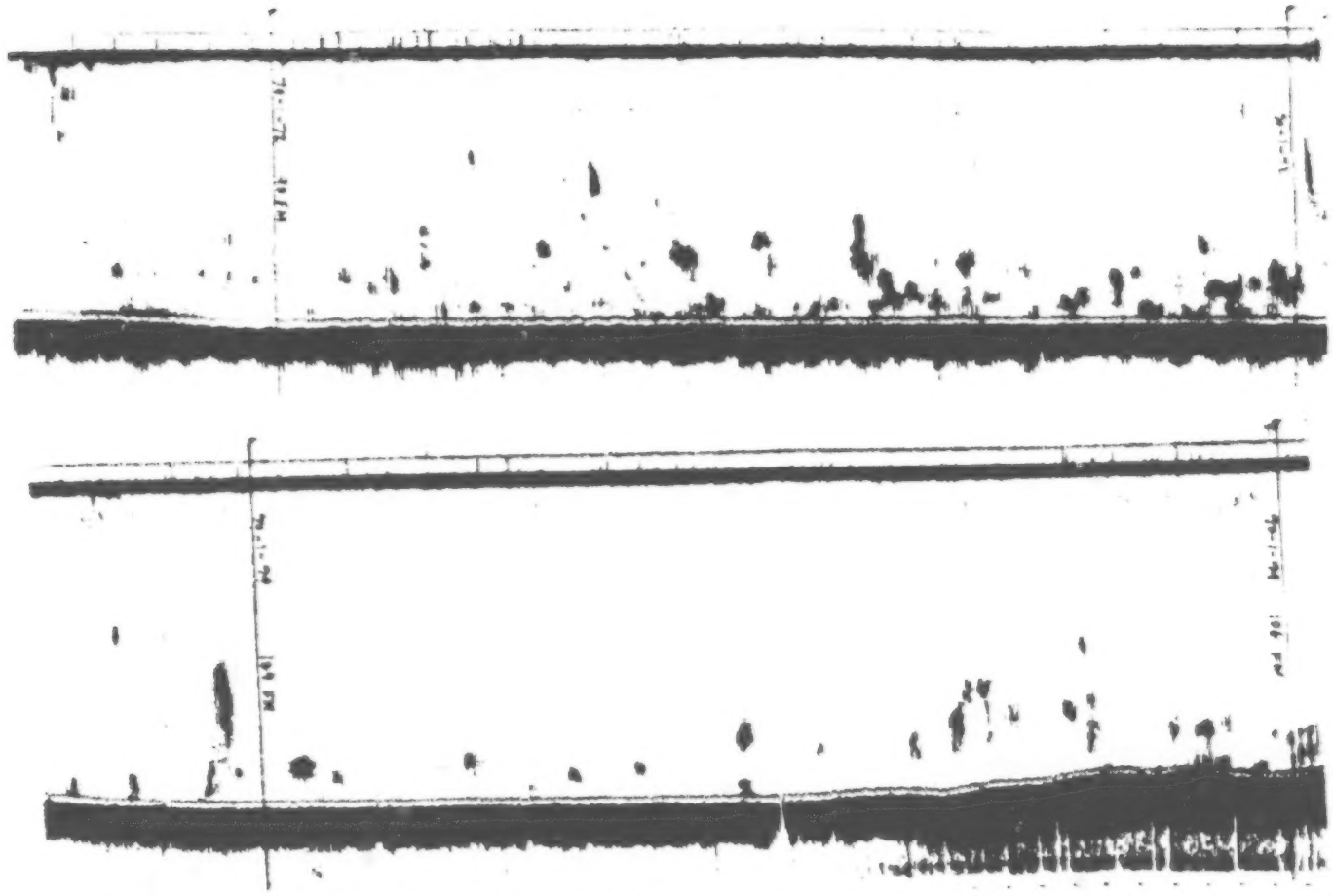
Echo Figure 1. Echograms of *G.B. Reed* on-bottom trawl hauls 69-3-4 (90 fms; 165 m) and 67-2-1 (110 fms, 201 m) completed in southeast Goose Island Gully, September 1967 and 1969 (Echo Table 1; Source: PBS Scientific Archives).

#3

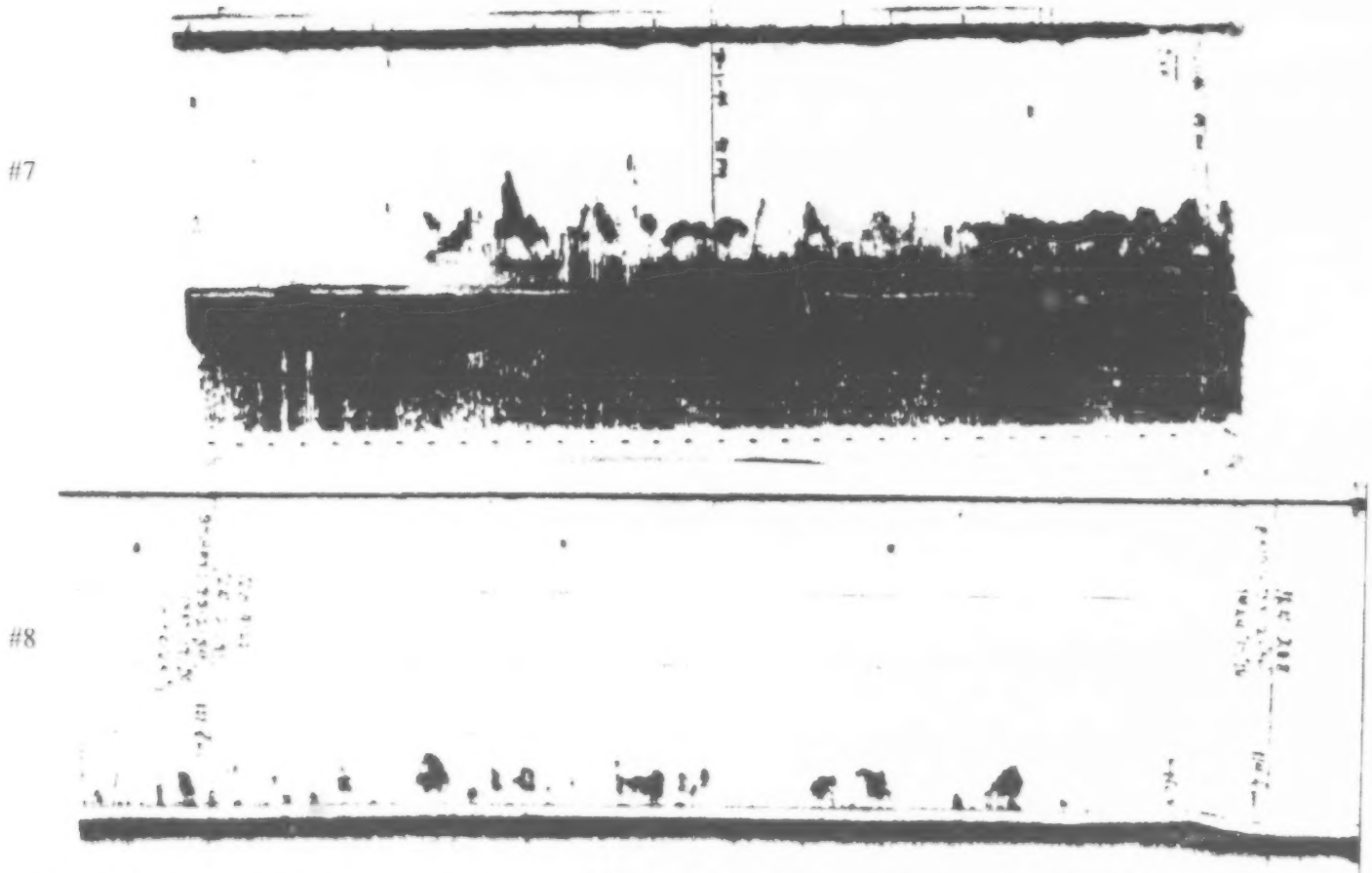


#4

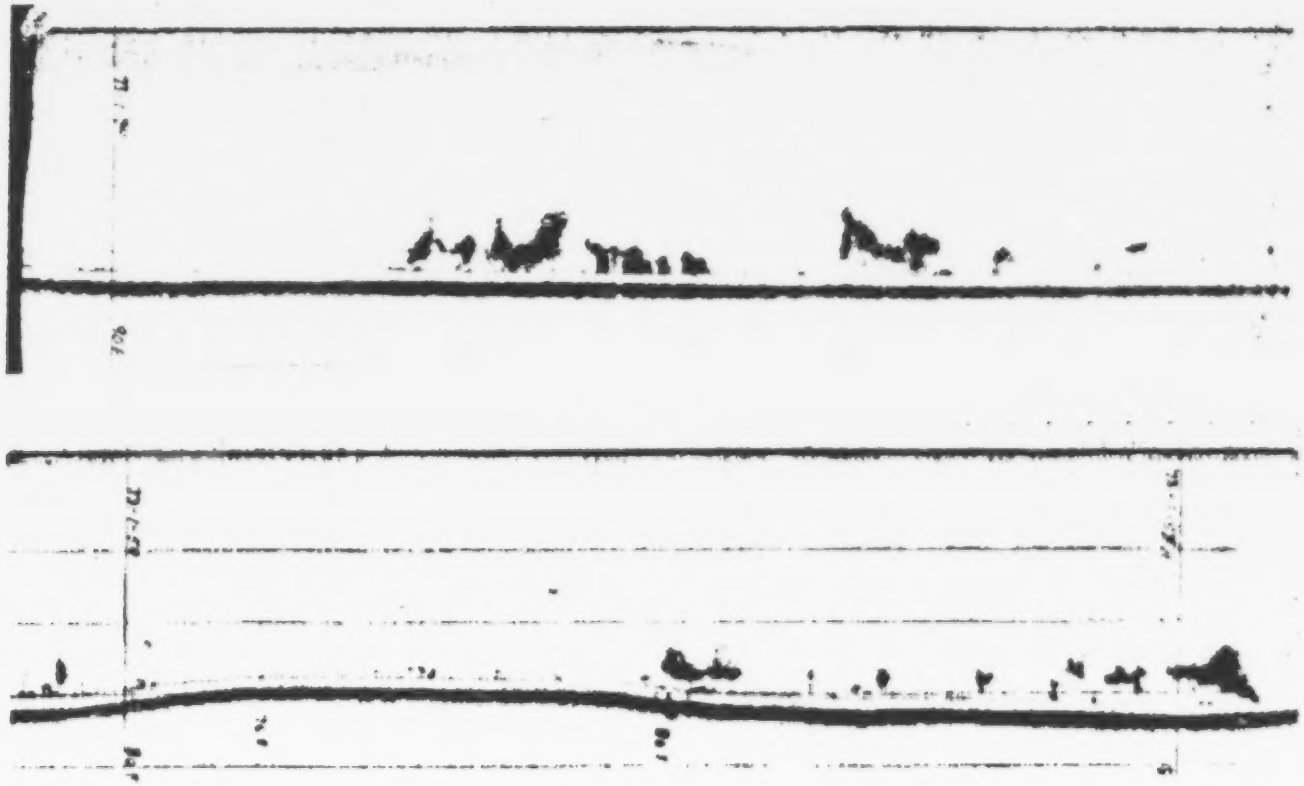
Echo Figure 2. Echograms of *G.B. Reed* on-bottom trawl hauls 67-2-10 (90 fms; 165 m) and 67-2-11 (110 fms, 201 m) completed in southeast Goose Island Gully, September 1967 (Echo Table 1; Source: PBS Scientific Archives).



Echo Figure 3. Echograms of *G.B. Reed* on-bottom trawl hauls 70-1-72 (90 fms; 165 m) and 70-1-79 (110 fms, 201 m) completed in northwest Goose Island Gully, June 1970 (Echo Table 1; Source: PBS Scientific Archives).



Echo Figure 4. Echograms of *G.B. Reed* on-bottom trawl hauls 70-1-94 (90 fms; 165 m) and 73-2-34 (110 fms, 201 m) completed on the southwest slope of Goose Island Bank, June 1970 and east Mitchell's Gully, September 1973 (Echo Table 1; Source: PBS Scientific Archives).



Echo Figure 5. Echograms of *G.B. Reed* on-bottom trawl hauls 73-1-34 (90 fms; 165 m) and 73-1-54 (110 fms, 201 m) completed in north Moresby Gully, July 1973 (Echo Table 1; Source: PBS Scientific Archives).

This page left blank on purpose.

Appendix table 1. Records of off-bottom (Off-2) and on-bottom (On-1) trawl hauls, by 20-fm depth interval, of the R/V *G.B. Reed* in northwest Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Net	Haul	Depth[a]		Start		Total	POP[b]			Other[c]	
		(fms)	(m)	Latitude	Longitude	(lbs)	(lbs)	L-F (N)		(lbs)	(spp)[d]
				51°	129°			M	F		
Off-2	98	90	165	20.5	22.2	788	293	137	119	309	*S. proriger*
%							27.1	53.5			
On-1	72	90	165	21.0	22.0	1933	282	77	69	978	*S. reedi*
	73			21.2	26.5	3144	13	7	8	2409	*S. proriger*
Total						5077	295	84	77		
%							5.8	52.2			
Off-2	92	110	201	20.0	23.0	520	439	111	137	26	*S. reedi*
	97			20.5	24.4	18	16	9	4	2	Pacific pollock
Total						538	455	120	141		
%							84.6	46.0			
On-1	74	110	201	20.5	25.5	4015	3245	137	142	183	Dover sole
	75			18.2	22.6	1371	1080	244	236	64	sablefish
	79			19.8	28.0	1422	178	43	61	849	*S. proriger*
	81			20.5	25.5	1655	1342	229	237	70	arrow. flounder
	86			20.5	31.5	809	242	49	94	161	*S. reedi*
	87			20.5	22.5	3192	2842	187	172	89	sablefish
Total						12464	8929	889	942		
%							71.6	48.6			

[a] Mid-points of 20 fm depth intervals (90 = 80 – 99, etc.). Equivalent values in metres.
[b] POP = Pacific ocean Perch
[c] Next largest landing to POP
[d] Arrowtooth flounder (*Atheresthes stomias*), Dover sole (*Microstomus pacificus*), Pacific pollock (*Theragra chalcogramma*), sablefish (*Anoplopoma fimbria*)

Appendix table 2a. Length-frequencies (nos.;%), by haul number, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-2) and on-bottom (On-1) trawls of the R/V *G.B. Reed*, at 80-99 fms in northwest Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork	Off-bottom (#98)				On-bottom							
length	Total--M		Total--F		72		73		Total--M		Total--F	
(cm)	N	%	N	%	M	F	M	F	N	%	N	%
10	...	...	...	...	1	...	...	...	1	1.2	...	...
12	...	...	...	...	0	...	...	...	0	0	...	...
14	...	...	...	...	0	...	...	...	0	0	...	...
16	...	...	...	...	0	...	...	...	0	0	...	...
18	...	...	...	...	0	...	...	...	0	0	...	...
20	...	...	1	0.8	1	...	2	...	3	3.6	...	...
22	...	...	1	0.8	0	1	1	1	1	1.2	2	2.6
24	1	0.7	1	0.8	0	2	1	0	1	1.2	2	2.6
26	1	0.7	2	1.7	2	0	0	2	2	2.4	2	2.6
28	16	11.7	9	7.6	0	2	1	0	1	1.2	2	2.6
30	33	24.1	30	25.2	0	5	2	1	1	1.2	6	7.8
32	39	28.5	36	30.3	3	4	...	2	3	3.6	6	7.8
34	28	20.4	16	13.4	3	2	...	1	3	3.6	3	3.9
36	4	2.9	15	12.6	2	2	...	1	2	2.4	3	3.9
38	2	1.5	1	0.8	13	3	...	...	13	15.5	3	3.9
40	8	5.8	2	1.7	30	9	...	...	30	35.7	9	11.7
42	5	3.6	3	2.5	20	17	...	...	20	23.8	17	22.1
44	...	...	1	0.8	2	17	...	...	2	2.4	17	22.1
46	...	...	1	0.8	...	4	...	...	...	...	4	5.2
48	...	...	...	...	...	1	...	...	...	...	1	1.3
Total	137	100.0	119	100.0	77	69	7	8	83	98.8	77	100.0
Mean	32.4		32.3						37.6		38.3	
S.D.	3.6		3.8						6.4		6.6	
%M	53.5								51.9			

Appendix table 2b. Length-frequencies (nos.; %), by haul number, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-2) and on-bottom (On-1) trawls of the R/V *G.B. Reed*, at 100-119 fms in northwest Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork length (cm)	Off-bottom								On-bottom			
	92		97		Total--M		Total--F		74		75	
	M	F	M	F	N	%	N	%	M	F	M	F
14	...	...	...	...	...	...	...	...	...	1	...	...
16	...	...	...	...	...	...	...	...	...	0	1	1
18	...	...	...	...	...	...	...	...	...	0	1	0
20	1	...	...	...	1	0.8	...	...	1	0	5	5
22	0	...	...	...	0	0	...	...	0	0	9	10
24	4	3	...	...	4	3.3	3	2.1	1	1	37	26
26	6	3	...	1	6	5.0	4	2.8	2	3	49	25
28	4	6	...	1	4	3.3	7	5.0	4	1	37	33
30	5	8	4	1	9	7.5	9	6.4	13	6	17	20
32	14	9	3	0	17	14.2	9	6.4	7	8	14	15
34	17	13	0	0	17	14.2	13	9.2	18	7	13	17
36	8	11	0	0	8	6.7	11	7.8	8	9	12	9
38	17	4	0	0	17	14.2	4	2.8	26	7	28	11
40	26	14	1	0	27	22.5	14	9.9	43	13	18	20
42	7	33	1	0	8	6.7	33	23.4	13	39	3	26
44	2	21	...	1	2	1.7	22	15.6	1	37	...	14
46	...	11	...	...	...	...	11	7.8	...	11	...	4
48	...	1	...	...	...	...	1	0.7	...	...	...	...
Total	111	137	9	4	120	100.0	141	100.0	137	142	244	235
Mean					35.1		38.2					
S.D.					5.2		6.1					
%M					46.0							

Appendix table 2b cont'd. Length-frequencies (nos.;%), by haul number, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-2) and on-bottom (On-1) trawls of the R/V *G.B. Reed*, at 100-119 fms in northwest Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork length (cm)	On-bottom (cont.)								Total--M		Total--F	
	79		81		86		87					
	M	F	M	F	M	F	M	F	N	%	N	%
14	...	...	...	1	...	...	...	...	...	...	2	0.2
16	...	...	1	1	...	...	2	1	4	0.4	3	0.3
18	...	...	0	0	1	...	1	2	3	0.3	2	0.2
20	...	...	3	2	0	1	1	4	10	1.1	12	1.3
22	...	...	3	8	0	0	0	3	12	1.3	21	2.2
24	1	...	5	7	0	0	5	6	49	5.5	40	4.2
26	0	1	24	22	1	1	6	3	82	9.2	55	5.8
28	3	2	23	25	7	2	14	8	88	9.9	71	7.5
30	5	7	47	41	11	6	15	14	108	12.1	94	10.0
32	5	4	45	32	13	8	20	18	104	11.7	85	9.0
34	5	4	39	41	5	8	39	30	119	13.4	107	11.3
36	1	5	10	16	5	7	14	12	50	5.6	58	6.2
38	7	2	13	8	6	2	25	6	105	11.8	36	3.8
40	9	3	11	11	...	6	29	6	110	12.4	59	6.3
42	7	17	4	14	...	24	16	30	43	4.8	150	15.9
44	...	16	1	7	...	23	...	25	2	0.2	122	12.9
46	...	...	...	1	...	6	...	4	...	...	26	2.8
48	...	...	...	...	...	...	...	...	...	...	...	...
Total	43	61	229	237	49	94	187	172	889	100.0	943	100.0
Mean									32.7		35.0	
S.D.									5.7		7.1	
%M									48.5			

Appendix table 2c. Length-frequencies (nos.;%), by haul number, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-2) and on-bottom (On-1) trawls of the R/V *G.B. Reed*, at 120-139 fms in northwest Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork	Off Bottom								On Bottom									
length	91		96		Total--M		Total --F		78		82		85		Total--M		Total--F	
(cm)	M	F	M	F	N	%	N	%	M	F	M	F	M	F	N	%	N	%
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	1	...	...	...	...	1	0.2	1	...	2	1	...	...	3	0.7	1	0.2
22	2	1	3	1	5	1.6	2	0.4	1	2	8	0	1	...	10	2.3	2	0.3
24	9	6	6	12	15	4.7	18	3.4	5	7	12	18	0	...	17	3.9	25	4.3
26	18	24	10	19	28	8.8	43	8.2	15	10	29	22	2	3	46	11.0	35	6.0
28	16	20	13	12	29	9.1	32	6.1	25	16	10	8	2	2	37	8.6	26	4.4
30	25	25	9	6	34	10.7	31	5.9	22	11	20	16	2	2	44	10.0	29	4.9
32	17	26	4	9	21	6.6	35	6.7	15	11	17	5	5	0	37	8.6	16	2.7
34	19	21	7	7	26	8.2	28	5.3	2	7	16	23	1	5	19	4.4	35	6.0
36	27	16	7	7	34	10.7	23	4.4	4	2	23	16	21	11	48	11.0	29	4.9
38	36	17	25	10	61	19.2	27	5.1	16	4	27	17	35	26	78	18.0	47	8.0
40	33	34	19	14	52	16.4	48	9.1	30	10	15	27	31	33	76	18.0	70	12.0
42	9	65	3	53	12	3.8	118	22.4	7	45	4	29	4	55	15	3.5	129	22.0
44	...	68	...	40	...	...	108	20.5	...	70	1	18	...	29	1	0.2	117	20.0
46	...	13	...	10	...	...	11	2.1	...	17	...	2	...	5	...	...	24	4.1
48	...	1	...	...	...	...	1	0.2	...	...	...	1	...	...	...	...	1	0.2
														...				
Total	211	338	106	200	317	100.0	526	100.0	143	212	184	203	104	171	431	100	586	100
Mean					33.8		37.2								34		38	
S.D.					5.5		6.8								5.7		6.5	
%M					37.6										42.4			

Appendix table 2d. Length-frequencies (nos.;%), by haul number, and selected statistics for male and female Pacific ocean perch caught by off-bottom (Off-2) and on-bottom (On-1) trawls of the R/V *G.B. Reed*, at 140-159 fms in northwest Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork	Off-bottom										On-bottom											
length	89		90		95		Total--M		Total--F		76		77		83		84		Total--M		Total--F	
(cm)	M	F	M	F	M	F	N	%	N	%	M	F	M	F	M	F	M	F	N	%	N	%
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	2	0.2	...	...
22	...	...	...	...	...	...	...	...	...	...	1	...	1	2	3	3	...	...	5	0.5	5	0.8
24	...	...	...	...	1	...	1	1	...	...	11	5	3	3	20	13	1	1	35	3.5	22	3.3
26	1	2	1	...	0	...	2	3	2	4	24	14	28	13	34	26	14	7	100	10.0	60	9.1
28	11	4	2	1	2	...	15	20	5	9	33	23	24	25	45	19	30	17	132	13.1	84	12.7
30	4	12	1	0	0	...	5	7	12	23	30	24	25	21	34	26	30	22	119	11.8	93	14.1
32	5	3	0	2	0	...	5	7	5	9	20	12	19	11	15	15	21	18	75	7.5	56	8.5
34	6	2	2	1	1	...	9	12	3	6	23	12	20	11	18	13	32	15	93	9.2	51	7.7
36	11	1	4	2	0	1	15	20	4	8	49	16	52	15	32	9	54	9	187	18.6	49	7.4
38	12	6	4	3	1	0	17	23	9	17	39	17	51	25	43	13	51	17	184	18.3	72	10.9
40	3	3	1	5		1	4	5	9	17	12	21	20	24	22	19	16	18	70	7.0	82	12.4
42	1	2	...	0	...	...	1	1	2	4	2	19	1	20	...	9	...	10	3	0.3	58	8.8
44	...	1	...	1	...	...	...	...	2	4	...	3	...	10	...	5	...	5	...	...	23	3.5
46	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	...	...	4	0.6
48	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	54	36	15	15	5	2	74	100	53	100	244	166	244	182	268	171	249	140	1005	100	659	100
Mean							33.8		34.6										32.9		33.8	
S.D.							4.4		5.0										4.8		5.83	
%M							58.3												60.4			

Appendix table 3. Records of off-bottom trawl (Off-3) hauls, by 20-fm depth interval, number, and sector, in Goose Island Gully, of the F/V *Royal Canadian*, August 1968 (Source: Harling 1968)

Haul	Sector[a]	Bottom		Off[b]		Open[c]		Catch				
		(fms)	(m)	(fms)	(m)	(fms)	(m)	Total	POP[d]		Other	
								(lbs)	(lbs)	%	(lbs)	Spp[e]
60-79 fms												
4	E	74-75	135-137	1-4	2-7	8-9	15-16	62	0	0	34	*S. proriger*
26	NE	69-68	126-124	1-2	2-4	7-9	13-16	1508	0	0	1478	Pacific hake
Total								1570	0	0	1512	
80-99 fms												
1	SE	87-96	158-176	2-7	4-13	8-9	15-16	1310	987	75.3	249	Pacific pollock
2	SE	98-80	179-146	12-20	22-37	9-11	16-20	409	53	13.0	282	Pacific pollock
3	E	76-86	139-157	0-2	0-4	7-9	13-16	42	18	42.9	10	*S. reedi*
5	NC	85-73	156-134	45	82	7	13	1255	0	0	1238	*S. flavidus*
6	SC	83-81	152-148	6-21	11-38	7-13	13-24	6604	0	0	6573	Pacific hake
7	SC	87-82	158-150	0-10	0-18	8-11	15-20	165	0	0	108	Pacific hake
13	SW	89-93	163-170	1-5	2-9	8-10	15-18	0	0	0	0	
21	NE	83-88	152-161	1-5	2-9	7-8	13-15	3552	234	6.6	3249	Pacific hake
22	NE	89-92	163-168	7-12	13-22	6-7	11-13	8979	106	1.2	8801	Pacific hake
24	E	86-84	157-154	0-2	0-4	7-8	13-15	2381	118	5.0	2129	Pacific hake
25	E	86-90	157-165	2-6	4-11	7-8	13-15	6481	13	0.2	6283	Pacific hake
29	SE	98-99	179-181	8-13	15-24	9-13	16-24	4588	4342	94.6	162	Pacific pollock
30	SE	84-92	154-168	0-10	0-18	7-11	13-20	325	109	33.5	116	Pacific pollock
31	SE	95-99	174-181	38-40	70-73	10-12	18-22	379	2	0.5	355	*S. flavidus*
Total								36470	5982	16.4	29555	

Appendix table 3 cont'd. Records of off-bottom trawl (Off-3) hauls, by 20-fm depth interval, number, and sector, in Goose Island Gully, of the F/V *Royal Canadian*, August 1968 (Source: Harling 1968)

Haul	Sector[a]	Bottom		Off[b]		Open[c]		Catch				
		(fms)	(m)	(fms)	(m)	(fms)	(m)	Total	POP[d]		Other	
								(lbs)	(lbs)	%	(lbs)	Spp
100-119 fms												
14	SW	105-102	192-187	1-9	2-16	7-11	13-20	2494	0	0	1628	*S. reedi*
15	SW	105-100	192-183	0-13	0-24	7-10	13-18	1	0	0	1	Other
16	SW	105-101	192-185	44-50	81-92	7-10	13-18	0	0	0	0	
17	SW	104-101	190-185	3-10	5-18	7-11	13-20	1264	0	0	1122	*S. reedi*
19	SW	102-100	187-183	82-86	150-157	7-10	13-18	29	0	0	12	blue shark
23	NE	107-102	196-187	12-16	22-29	6-8	11-15	E9238	E112	1.2	E9108	Pacific hake
Total								13026	112	1.2	11871	
140-159 fms												
20	W	154-155	282-284	1-3	2-5	9-10	16-18	269	2	0.7	259	Pacific hake
Grand Total								51335	6096	11.9	43197	
Gear Failure												
12	NE	X doors						0				
27	SE	Fouled						0				

[a] Sectors: C = central; E = east; NC = north central; NE = northeast; SC = south central; SE = southeast; SW = southwest.
[b] Off = depth from footrope to bottom.
[c] Open = vertical opening of net.
[d] POP = Pacific ocean perch.
[e] Species: blue shark (*Prionace glauca*); Pacific hake (*Merluccius productus*); Pacific pollock (*Theragra chalcogramma*).

Appendix table 4. Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the off-bottom (Off-3) trawl of the F/V *Royal Canadian*, at the 80-99 fathom depth interval in northeast, east, and southeast Goose Island Gully, August 1968. (Source: Harling 1968)

Fork length (cm)	1		2		3		21		22	
	M	F	M	F	M	F	M	F	M	F
24	...	...	...	...	...	...	...	1	...	...
26	...	...	...	...	...	...	...	0	...	...
28	...	...	...	...	...	...	...	0	...	...
30	...	...	...	...	...	...	...	0	...	...
32	...	...	...	...	...	...	...	0	...	...
34	2	1	...	...	...	...	...	0	...	...
36	6	3	1	...	...	...	...	0	...	...
38	18	3	0	2	...	...	3	2	1	...
40	37	16	2	1	2		7	8	3	4
42	22	35	6	3	1	2	14	19	6	9
44	6	37	...	4	...	1	3	26	4	15
46	...	20	...	3	...	1	...	13	...	1
48	...	4	...	...	...	...	...	...	...	...
50	...	...	...	...	...	...	...	...	...	...
Total	91	119	9	13	3	4	27	69	14	29
%M	43.3		40.9		42.9		28.1		32.6	
Depth:										
Bottom (fms)	87-96		98-80		70-86		83-88		89-92	
(m)	159-176		179-146		128-157		152-161		163-168	
Off (fms)	2-7		12-20		0-2		1-5		7-12	
bottom (m)	4-13		22-37		0-4		2-9		13-22	
Catch:										
Total (lbs)	1310		409		42		3552		8979	
POP (lbs)	987		53		18		234		106	
%POP	75.3		13.0		42.9		6.6		1.2	

Appendix table 4 cont'd. Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the off-bottom (Off-3) trawl of the F/V *Royal Canadian*, at the 80-99 fathom depth interval in northeast, east, and southeast Goose Island Gully, August 1968. (Source: Harling 1968)

Fork length[a] (cm)	25		29		30		80-99			
	M	F	M	F	M	F	Males		Females	
24	...	...	...	1	...	...	...	...	2	0.3
26	...	...	...	0	...	...	...	...	0	0
28	...	...	...	0	...	...	...	...	0	0
30	...	...	...	0	...	...	...	...	0	0
32	...	...	...	0	...	...	...	...	0	0
34	...	...	6	7	...	...	10	2.4	11	1.8
36	...	...	21	13	...	...	35	8.5	21	3.4
38	...	...	45	25	...	...	78	18.9	40	6.4
40	1	2	73	45	6	1	139	33.7	84	13.5
42	...	1	61	76	6	1	119	28.9	148	23.8
44	...	3	16	105	1	10	31	7.5	207	33.2
46	...	...	...	48	...	8	...	...	95	15.2
48	...	...	...	7	...	3	...	...	14	2.2
50	...	...	...	...	...	1	...	...	1	...
Total	1	6	222	327	13	24	412	100.0	623	99.8
Mean (cm)							40.0		42.5	
S.D.							2.3		3.1	
%M	14.3		40.4		35.1		39.8			
Depth:										
Bottom (fms)	86-90		98-99		84-92		70-99			
(m)	157-165		179-181		154-168		128-181			
Above (fms)	2-6		8-13		10		0-20			
bottom (m)	4-11		15-24		0-18		0-37			
Catch:										
Total (lbs)	6481		4588		325		25686			
POP (lbs)	13		4342		109		5980			
%POP	0.2		94.6		33.5		23.2			

Appendix table 5 Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by on-bottom (On-1a) trawl of the R/V *G.B. Reed*, at 80-99 fms in southeast and northeast Goose Island Gully, September 1967. (Source: Westrheim *et al.* 1968)

Fork length (cm)	4		7		10		12		23		Total--M		Total--F	
	M	F	M	F	M	F	M	F	M	F	N	%	N	%
8	...	...	...	...	...	...	...	...	1	1	1	0.1	1	0.1
10	...	...	...	...	...	1	3	1	1	1	4	0.4	3	0.3
12	...	4	...	1	...	0	8	7	2	4	10	0.9	16	1.5
14	...	0	...	0	1	2	5	3	6	3	12	1.1	8	0.7
16	8	5	2	0	5	1	22	21	16	10	53	4.7	37	3.4
18	15	7	3	3	9	10	21	17	15	16	63	5.6	53	4.9
20	24	21	17	6	16	15	15	14	30	16	102	9.0	72	6.6
22	24	14	19	12	7	8	3	5	5	6	58	5.1	45	4.1
24	10	12	25	24	15	12	10	7	12	12	72	6.4	67	6.1
26	27	31	85	100	30	19	16	14	19	15	177	15.6	179	16.4
28	26	32	111	96	21	18	13	13	10	15	181	16.0	174	16.0
30	21	31	47	53	20	12	17	8	2	3	107	9.5	107	9.8
32	0	8	4	9	15	5	26	23	1	1	46	4.1	46	4.2
34	1	...	1	0	24	14	55	36	3	2	84	7.4	52	4.8
36	...	...	...	1	26	12	43	38	2	4	71	6.3	55	5.0
38	...	...		...	7	3	25	11	14	10	46	4.1	24	2.2
40	...	...	...	...	6	3	7	11	6	13	19	1.7	27	2.5
42	...	...	...	...	2	8	3	11	7	9	23	2.0	28	2.6
44	...	...	...	...	...	30	2	12	0	19	2	0.2	61	5.6
46	...	...	...	...	...	14	...	5	1	14	1	0.1	33	3.0
48	...	...	...	...	...	...	...	...	...	2	...	...	2	0.2
Total	156	165	314	305	204	187	294	257	153	176	1132	100.0	1090	100.0
Mean (cm)											27.2		28.8	
S.D.											6.8		8.0	
%M	48.6		50.7		52.2		53.4		46.5		50.9			
Depth: (fms)	90-91		92-94		92		88-92		99-96		80-99			
(m)	165-166		168-172		168		161-168		181-176		146-181			
Catch:														
Total (lbs)	909		2435		2286		2769		1813		10212			
POP (lbs)	388		1856		415		1275		310		4244			
%POP	42.7		76.2		18.2		46.0		17.1		41.6			

Appendix table 6 Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by on-bottom (On-1b) trawl of the R/V *G.B. Reed*, at 80-99 fms in northeast and southeast Goose Island Gully, September 1969. (*N.B.* Haul 28 omitted--not sexed.) (Source: Harling *et al.* 1969)

Fork length (cm)	4		9		17		26		33		Total--M		Total--F	
	M	F	M	F	M	F	M	F	M	F	N	%	N	%
10	...	...	...	...	...	1	...	...	...	...	...	...	1	0.1
12	...	...	...	2	1	1	3	...	...	...	4	0.3	3	0.3
14	...	...	...	0	0	0	3	...	...	...	3	0.2	0	0
16	1	2	1	1	0	0	2	1	...	...	4	0.3	4	0.3
18	0	0	2	2	0	2	8	7	...	...	10	0.8	11	0.9
20	2	1	4	3	2	2	9	12	...	...	17	1.4	18	1.5
22	17	7	10	8	3	1	16	10	1	...	47	3.9	26	2.2
24	30	32	19	12	11	17	18	13	7	2	85	7.1	76	6.4
26	88	75	34	38	14	9	13	7	21	10	170	14.1	139	11.7
28	67	58	40	54	5	10	10	18	25	18	147	12.2	158	13.3
30	42	38	62	64	20	17	18	20	54	36	196	16.3	175	14.8
32	36	31	73	79	49	34	28	25	57	58	243	20.2	227	19.1
34	10	18	32	34	37	40	12	19	23	37	114	9.5	148	12.5
36	6	7	3	7	13	13	6	4	14	16	42	3.5	47	4.0
38	8	11	2	5	24	19	2	0	23	8	59	4.9	43	3.6
40	6	2	2	1	19	9	0	2	13	8	40	3.3	22	1.9
42	2	6	2	1	12	12	2	2	3	11	21	1.7	32	2.7
44	...	4	...	...	1	10	...	14	1	9	2	0.2	37	3.1
46	...	3	...	...	...	7	...	3	...	6	...	...	19	1.6
Total	315	295	286	311	211	204	150	157	242	219	1204	100.0	1186	100.0
Mean (cm)											30.0		30.9	
S.D.											5.1		5.7	
% M	51.6		47.9		50.8		48.9		52.5		50.4			
Depth (fms)	91-93		88		97-98		90		96-93		88-98			
(m)	166-170		161		178-179		165		176-170		161-179			
Catch:														
Total (lbs)	1034		4056		4250		2294		4108		15742			
POP (lbs)	818		2135		3166		431		2570		9120			
%POP	79.1		52.6		74.5		18.8		62.6		57.9			

Appendix table 7. Records of off-bottom (Off-3) and on-bottom (On-X), trawl catches of Pacific ocean perch landed by chartered, domestic commercial vessels operating in Goose Island Gully, July 1970-71. (Source: Smith *et al.* 1972)

Sector[a]	Hauls	Hrs	Bottom depth[b]		Landings (lbs)		
	(nos.)		(m)	(fms)	Total	POP[c]	% POP
1970: Off-bottom (Off-3)[d]							
SE	1	4	207	113	6953	4984	72
NE	1	1	146	80	1865	1066	57
NE	4	10	192-201	105-110	7262	7262	100
NE	7	26	165-192	90-105	34304	21004	61
NE	16	52	174-212	95-116	87862	45717	52
NW	2	4	174-210	95-115	4973	4642	93
Total	31	97	146-212	80-116	143219	84675	59
1970: On-bottom (On-X)[e]							
SE	8	30	188-214	103-117	45560	34060	75
NE	2	8	183-220	100-120	5520	5520	100
NE	15	52	165-192	90-115	54889	43240	79
NW	4	18	159-207	87-113	6428	3680	57
NW	5	21	178-210	97-115	17020	17020	100
Total	34	129	159-220	87-120	129417	103520	80
1971: On-bottom (On-X)[e]							
NE	13	35	119-185	65-101	39394	39394	100
1971: Off-bottom (Off-3)[e]							
SE	5	19	201-221	110-121	48608	37116	76
NE	8	37	146-207	80-113	45280	25306	56
NW	3	14	165-231	90-126	10123	10123	100
Total	16	70	146-231	80-126	104011	72545	70

[a] Sector: NE = northeast; NW = northwest; SE = southeast; SW = southwest.
[b] Depth: Original records in fathoms. Equivalent values in meters.
[c] POP = Pacific ocean perch
[d] F/V *Canadian No. 1*
[e] F/V *Royal Canadian*

Appendix table 8. Length frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the on-bottom (On-1) trawl of the R/V *G.B. Reed*, in northeast and southeast Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork length (cm)	Northeast								Southeast				Total			
	104		105		106		107		108		109		Males		Females	
	M	F	M	F	M	F	M	F	M	F	M	F	N	%	N	%
18	1	...	...	...	...	...	...	...	...	...	...	...	1	0.1	...	...
20	2	...	1	...	...	...	3	...	...	...	...	...	6	0.6	...	...
22	3	3	3	...	...	...	1	1	...	2	2	4	9	0.9	10	1.1
24	13	8	1	1	14	5	6	2	3	7	7	6	44	4.3	24	2.7
26	28	19	2	6	24	16	10	16	37	20	22	22	123	12.1	83	9.5
28	27	22	6	9	20	17	16	15	36	40	35	37	140	13.8	123	14.0
30	35	38	12	7	16	14	24	23	32	37	32	29	151	14.8	134	15.3
32	15	34	17	10	13	9	22	18	17	17	22	11	106	10.4	90	10.3
34	12	12	5	6	7	3	16	16	9	9	12	6	61	6.0	49	5.6
36	2	2	12	3	15	8	19	7	2	3	2	8	52	5.1	23	2.6
38	2	1	10	7	32	8	52	10	4	2	11	6	111	10.9	26	3.0
40	19	2	12	15	29	15	34	19	34	7	23	8	151	14.8	51	5.8
42	7	6	6	37	3	33	7	15	14	20	23	19	60	5.9	97	11.1
44	...	8	1	49	...	25	...	7	...	31	1	29	2	0.2	124	14.1
46	...	1	...	19	...	3	...	...	...	12	...	9	...	...	41	4.7
48	...	...	...	1	...	...	...	...	...	1	...	...	...	...	2	0.2
Total	166	156	88	170	173	156	210	149	188	208	192	194	1017	100.0	877	100.0
Mean (cm)													32.7		34.6	
S.D.													5.7		7.0	
% M	51.6		34.1		52.6		58.5		47.5		49.7		53.7			

Appendix table 8 cont'd. Length frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the on-bottom (On-1) trawl of the R/V *G.B. Reed*, in northeast and southeast Goose Island Gully, June 1970. (Source: Harling *et al.* 1970)

Fork length (cm)		Northeast								Southeast				Total			
		104		105		106		107		108		109		Males		Females	
		M	F	M	F	M	F	M	F	M	F	M	F	N	%	N	%
Depth:	(fms)	88-90		110		120-123		106-110		109-108		110		88-123			
	(m)	161-165		201		220-225		194-201		199-198		201		161-225			
Catch:																	
Total	(lbs)	604		4285		1113		2079		4403		4526		17010			
POP	(lbs)	323		1301		466		993		4195		4097		11375			
%POP		53.5		30.4		41.9		47.8		95.3		90.5		66.9			

Appendix table 9. Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the on-bottom (On-1) trawl of the R/V *G.B. Reed,* at the 80-99 fm depth interval, in Moresby Gully, September 1974 (On-1b) and 1978 (On-1c). (Source: Westrheim *et al.* 1974; Harling *et al.* 1979)

Fork length (cm)	September 1974								September 1978							
	5		6		Total-M		Total-F		34		36		Total-M		Total-F	
	M	F	M	F	N	%	N	%	M	F	M	F	N	%	N	%
12	...	...	...	...	...	...	...	...	1	...	...	...	1	0.4	...	...
14	...	...	...	...	...	...	...	...	0	...	...	...	0	0	...	...
16	...	...	...	...	...	...	...	...	2	...	...	...	2	0.7	...	...
18	...	1	...	...	...	...	1	0.3	0	3	...	...	0	0	3	1.2
20	1	4	1	...	2	0.5	4	1.2	4	5	...	...	4	1.5	5	2.0
22	34	31	5	9	39	10.3	40	11.9	7	9	3	3	10	3.7	12	4.9
24	63	49	14	17	77	20.4	66	19.6	27	21	6	4	33	12.2	25	10.2
26	32	20	14	13	46	12.2	33	9.8	14	15	2	11	16	5.9	26	10.6
28	28	21	21	14	49	13.0	35	10.4	3	5	3	4	6	2.2	9	3.7
30	31	18	16	14	47	12.5	32	9.5	4	5	21	13	25	9.3	18	7.3
32	16	19	10	11	26	6.9	30	8.9	3	8	40	28	43	15.9	36	14.7
34	20	13	6	5	26	6.9	18	5.3	12	3	35	17	47	17.4	20	8.2
36	8	10	4	0	12	3.2	10	3.0	4	1	13	9	17	6.3	10	4.1
38	3	2	1	1	4	1.1	3	0.9	3	0	7	2	10	3.7	2	0.8
40	1	2	5	1	6	1.6	3	0.9	4	3	17	0	21	7.8	3	1.2
42	4	1	19	1	23	6.1	3	0.9	2	1	20	8	22	8.1	9	3.7
44	2	7	15	14	17	4.5	21	6.2	3	3	7	22	10	3.7	25	10.2
46	1	4	2	28	3	0.8	32	9.5	...	2	2	30	2	0.7	32	13.1
48	...	1	...	6	...	...	7	2.1	...	1	1	7	1	0.4	8	3.3
50	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	0.8
Total	244	203	133	134	377	100.0	338	100.3	93	85	177	160	270	100.0	245	100.0

Appendix table 9 cont'd. Length-frequencies (nos.), by haul number, and selected statistics for male and female Pacific ocean perch caught by the on-bottom (On-1) trawl of the R/V *G.B. Reed,* at the 80-99 fm depth interval, in Moresby Gully, September 1974 (On-1b) and 1978 (On-1c). (Source: Westrheim *et al.* 1974; Harling *et al.* 1979)

Fork length (cm)		September 1974								September 1978							
		5		6		Total-M		Total-F		34		36		Total-M		Total-F	
		M	F	M	F	N	%	N	%	M	F	M	F	N	%	N	%
Mean	(cm)					29.5		30.7						32.5		33.9	
S.D.						6.4		8.1						6.6		8.7	
%M		54.6		49.8		52.7				52.2		52.5		52.4			
Depth[a]																	
Bottom	(fms)	90		94-89			89-94			91-94		90-93			90-94		
	(m)	165		172-163			163-172			167-172		165-170			165-172		
Catch:																	
Total	(lbs)	3482		2802			6284			509		3868			4377		
POP	(lbs)	350		403			753			143		766			909		
%POP		10.1		14.4			12.0			28.1		19.8			20.8		

[a] Depth at beginning and ending of haul.

Appendix table 10. Records of off-bottom (Off-X) trawl catches, by 40-m depth interval, of Pacific ocean perch by foreign vessels in Area 3D, June-August 1989. (Source: PBS Groundfish Data Base, GFBio)

Interval[a]		Vessel	Time		Sample	Depth[b]						Catch (t)[d]				
						Bottom		Headrope		B-H[c]		Total	Rockfish		Hake	Other
(fms)	(m)		Year	Month		(m)	(fms)	(m)	(fms)	(m)	(fms)		POP	Other		
142	260	3007	1989	Aug	66805	250	137	180	98	70	38	10.4	0.3	Tr	10.1	0
164	300	3028	1989	Jul	67230	305	167	250	137	55	30	2.5	0.9	0.1	1.5	Tr
		3053	1989	Jul	67418	310	169	210	115	100	55	2.9	1.5	Tr	1.4	0
	Total											5.4	2.4	0.1	2.9	Tr
186	340	3043	1989	Aug	67141	320	175	40	22	280	153	7.0	3.0	0.2	3.8	Tr
		3053	1989	Jul	67306	335	183	230	126	105	57	39.2	13.5	0	25.7	0
	Total											46.2	16.5	0.2	29.5	Tr
208	380	3043	1989	Aug	67169	360	197	20	11	340	186	1.8	1.5	Tr	0.3	Tr
		3009	1989	Jul	66970	380	208	250	137	130	71	25.1	21.6	0	3.5	0
		3053	1989	Jul	67312	380	208	260	142	120	66	11.6	2.8	Tr	8.8	0
	Total											38.5	25.9	Tr	12.6	Tr
230	420	3053	1989	Jul	67314	400	219	280	153	120	66	4.3	1.6	Tr	2.7	0
251	460	3042	1989	Jun	67114	440	240	220	120	220	120	37.9	2.0	Tr	35.9	0
		3001	1989	Jun	67000	450	246	300	164	150	82	27.2	18.8	0	8.4	0
		3042	1989	Jun	67118	450	246	300	164	150	82	11.9	4.0	0	7.9	0
	Total											77.0	24.8	0	52.2	0
273	500	3042	1989	Jun	67116	480	262	200	109	280	153	45.5	1.0	0	44.5	Tr

Appendix table 10. cont'd. Records of off-bottom (Off-X) trawl catches, by 40-m depth interval, of Pacific ocean perch by foreign vessels in Area 3D, June-August 1989. (Source: PBS Groundfish Data Base, GFBio)

[a] Mid-points of 40-m depth intervals (260 = 240-279, etc.). Equivalent values in fathoms.
[b] Original values in meters. Equivalent values in fathoms
[c] B-H = bottom depth - headrope depth = height of headrope above the bottom. Original measurement in meters.
[d] Tr = trace = < 50 kg.

Appendix table 11a. Length-frequencies (nos.), by sample number and month, and sex ratio (% males), for male and female Pacific ocean perch caught by off-bottom (Off-X) trawls of foreign vessels, at selected 40-m depth intervals (260-340) in Area 3D, July-August 1989. (Source: PBS Groundfish Data Base, GFBio)

Sample		66805		67230		67418		Total		67141		67306		Total	
Month		Aug		Jul		Jul				Aug		Jul			
Depth	(m)	260						300						340	
	(fms)	142						164						186	
Fork length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F
28		...	...	...	1	...	...	...	1	...	...	...	...	...	...
30		...	...	...	0	...	...	...	0	...	...	...	...	...	...
32		1	...	7	1	1	...	8	1	4	3	...	...	4	3
34		6	6	10	4	7	4	17	8	6	8	...	4	6	12
36		13	24	30	30	14	14	44	44	16	28	9	11	25	39
38		8	29	35	49	8	18	43	67	22	43	15	30	37	73
40		3	26	16	25	2	29	18	54	2	22	6	31	8	53
42		0	21	6	17	0	33	6	50	5	24	7	25	12	49
44		4	25	4	6	7	26	11	32	...	12	3	20	3	32
46		...	10	...	8	...	36	...	44	...	7	1	16	1	23
48		...	3	...	1	...	17	...	18	...	2	...	9	...	11
50		...	1	...	2	...	4	...	6	...	...	...	1	...	1
52		...	...	...	1	...	...	...	1	...	...	...	...	...	...
Total		35	145	108	145	39	181	147	326	55	149	41	147	96	296
%M		19.4		42.7		17.7		31.1		27.0		21.8		24.5	

Appendix table 11b. Length-frequencies (nos.), by sample number and month, and sex ratio (% males), for male and female Pacific ocean perch caught by off-bottom (Off-X) trawls of foreign vessels, at selected 40-m depth intervals (380-500) in Area 3D, June-August 1989. (Source: PBS Groundfish Data Base, GFBio)

Sample		67169		66970		67312		Total		67314		67114		67000		67118		Total		67116	
Month		Aug		Jul		Jul				Jul		Jun		Jun		Jun				Jun	
Depth	(m)							380		420								460		500	
	(fms)							208		230								251		273	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
30		1	...	1	...	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...
32		3	1	6	2	...	...	9	3	8	1	1	1	...	...	...	1	1	2	1	...
34		10	9	0	8	3	3	13	20	27	8	5	7	12	5	4	4	21	46	3	2
36		23	26	38	13	9	10	70	49	23	22	15	17	28	26	13	11	56	134	15	17
38		15	50	25	39	12	16	52	105	5	32	17	28	18	47	13	26	48	152	6	31
40		4	21	8	16	7	18	19	55	3	20	23	37	5	16	10	18	38	87	10	41
42		1	24	2	10	2	17	5	51	1	23	8	36	1	20	1	27	10	59	5	17
44		...	15	2	4	...	13	2	32	...	7	...	25	...	8	1	23	1	33	...	17
46		...	4	1	4	...	5	1	13	...	5	...	19	...	2	...	15	...	17	...	13
48		...	1	...	...	...	2	...	3	...	0	...	10	...	...	...	3	...	3	...	5
50		...	...	...	...	...	1	...	1	...	1	...	1	...	...	...	1	...	1	...	...
Total		57	151	83	96	33	85	173	332	68	119	69	181	64	124	42	129	175	534	40	143
%M		27.4		46.4		28.0		34.7		36.4		27.6		34.0		24.6		24.7		21.9	

Appendix table 12. Records of off-bottom (Off-X) trawl catches, by 40-m depth interval, of Pacific ocean perch by foreign vessels in Area 3Cn, May-September 1988-89. (Source: PBS Groundfish Data Base, GFBio)

Interval[a]		Vessel	Time		Sample	Depth[b]						Catch (t)[d]				
(fms)	(m)		Year	Month		Bottom		Headrope		B-H[c]		Total	Rockfish		Hake	Other
						(m)	(fms)	(m)	(fms)	(m)	(fms)		POP	Other		
77	140	3009	1989	Jul	66964	140	77	130	71	10	5	10.6	1.2	0.5	8.6	0.3
120	220	3043	1989	Aug	67122	200	109	30	16	170	93	23.5	1.4	0.8	21.3	Tr
142	260	3025	1988	Jul	66363	260	142	170	93	90	49	15.0	1.0	Tr	13.7	0.3
154	300	3068	1988	May	66519	310	169	130	71	180	98	24.3	1.0	0.3	23.0	0
		3000	1988	Jun	66277	300	164	180	98	120	66	18.1	1.3	0	16.8	0
		3003	1989	Aug	66896	300	164	170	93	130	71	22.2	17.3	4.0	0.9	0
	Total											64.6	19.6	4.3	40.7	0
186	340	3003	1989	Aug	66882	350	191	160	87	190	104	23.8	0.9	0.4	22.5	0
		3006	1989	Sep	66293	330	180	200	109	130	71	11.0	2.3	Tr	8.6	0.1
	Total											34.8	3.2	0.4	31.1	0.1
208	380	3022	1988	Jul	66345	380	208	170	93	210	115	17.6	1.6	1.0	14.9	0.1

[a] Mid-points of 40-m depth intervals (260 = 240-279, etc.). Equivalent values in fathoms.
[b] Original values in meters. Equivalent values in fathoms
[c] B-H = bottom depth - headrope depth = height of headrope above the bottom. Original measurement in meters.
[d] Tr = trace = < 50 kg.

Appendix table 12 cont'd. Records of off-bottom (Off-X) trawl catches, by 40-m depth interval, of Pacific ocean perch by foreign vessels in Area 3Cn, May-September 1988-89. (Source: PBS Groundfish Data Base, GFBio)

Interval[a]		Vessel	Time		Sample	Depth						Catch (t)[d]				
(fms)	(m)		Year	Month		Bottom		Headrope		B-H[c]		Total	Rockfish		Hake	Other
						(m)	(fms)	(m)	(fms)	(m)	(fms)		POP	Other		
230	420	3000	1988	Jun	66289	400	219	170	93	230	126	23.6	1.0	0.2	22.3	0.1
		3028	1989	Jul	67216	400	219	175	96	225	123	12.7	1.5	0.1	9.8	1.3
		3009	1989	Jul	66974	400	219	270	148	130	71	27.8	1.8	0.4	25.6	0
		3022	1989	Jul	66924	400	219	210	114	190	104	22.1	12.0	0.1	10.0	0
		3043	1989	Aug	67131	400	219	150	82	250	137	18.1	0.9	0.2	17.0	Tr
	Total											104.3	17.2	1.0	84.7	1.4
251	460	3028	1989	Jul	67222	450	246	204	112	246	134	7.3	3.0	3.3	1.0	Tr
		3003	1989	Aug	66890	450	246	180	98	270	148	22.2	17.3	4.0	0.9	0
	Total											29.5	20.3	7.3	1.9	Tr
273	500	3001	1989	Jun	68003	500	219	210	114	290	158	26.3	0.3	0	26.0	Tr

[a] Mid-points of 40-m depth intervals (260 = 240-279, etc.). Equivalent values in fathoms.
[b] Original values in meters. Equivalent values in fathoms
[c] B-H = bottom depth - headrope depth = height of headrope above the bottom. Original measurement in meters.
[d] Tr = trace = < 50 kg.

Appendix table 13a. Length-frequencies (nos), by sample number, month, and year, and sex ratio (% males), for male and female Pacific ocean perch caught by off-bottom (Off-X) trawls of foreign vessels, at selected 40-m depth intervals (140 and 220-340) in Area 3Cn, May-September 1988-89. (Source: PBS Groundfish Data Base, GFBio)

Sample		66964		67122		66363		66519		66277		66896		Total		66882		66293		Total	
		Jul-89		Aug-89		Jul-88		May-88		Jun-88		Aug-89				Aug-89		Sep-89			
Depth	(m)	140		220		260								300						340	
	(fms)	77		120		142								164						186	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
26		2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28		9	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30		15	...	6	...	0	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...
32		23	6	7	3	15	3	3	4	...	...	2	1	5	5	...	...	...	...	...	...
34		8	20	1	2	43	18	16	20	1	2	17	17	34	39	...	2	...	...	...	2
36		20	44	0	21	31	45	19	28	4	5	18	26	41	59	9	10	...	...	9	10
38		2	12	3	75	11	53	15	33	13	18	12	12	40	63	24	24	...	4	24	28
40		...	...	1	59	4	33	5	38	11	43	8	26	24	107	35	49	3	2	38	51
42		...	...	1	12	3	16	3	28	10	31	9	19	22	78	25	35	6	3	31	38
44		...	...	...	4	1	11	2	37	4	42	3	17	9	96	2	17	4	17	6	34
46		...	...	...	1	0	7	...	47	...	43	...	10	...	100	3	10	1	69	4	79
48		...	...	...	3	2	2	...	13	...	13	...	3	...	29	...	2	2	62	2	64
50		...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	1	...	5	...	6
Total		79	82	19	180	111	189	63	248	43	198	69	131	176	577	98	150	16	162	114	312
%M		49.1		9.5		37.0		20.3		17.8		34.5		23.4		39.5		9.0		26.8	

Appendix table 13b. Length-frequencies (nos), by sample number, month, and year, and sex ratio (% males), for male and female Pacific ocean perch caught by off-bottom (Off-X) trawls of foreign vessels, at selected 40-m depth intervals (380-500), in Area 3Cn, June-August 1988-89. (Source: PBS Groundfish Data Base, GFBio)

Sample		66345		66289		67216		66974		66924		67131		Total		67222		66890		Total		68003	
		Jul-88		Jun-88		Jul-89		Jul-89		Jul-89		Jul-89				Jul-89		Aug-89				Jun-89	
Depth	(m)	380												420						460		500	
	(fms)	208												230						251		273	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
28																							
30		1	...	2	...	...	...	...	...	1	...	...	...	3	...	...	...	...	...	...	...	...	...
32		2	...	3	2	...	...	...	...	9	...	1	...	13	2	...	...	3	2	3	2	4	1
34		9	6	7	4	...	6	1	...	16	5	10	12	34	27	1	1	8	15	9	16	10	7
36		10	6	7	10	...	22	2	3	15	12	8	23	32	70	1	6	16	26	17	32	13	10
38		8	24	3	43	7	25	9	7	15	13	9	32	43	120	5	2	9	18	14	20	10	21
40		20	31	...	61	4	53	11	12	15	29	10	24	40	179	12	17	15	36	27	53	10	26
42		14	64	...	34	4	34	8	10	12	14	6	10	30	102	6	24	6	36	12	60	6	19
44		6	41	...	34	1	39	7	17	7	17	1	11	16	118	3	60	10	25	13	85	2	27
46		...	15	...	50	...	53	1	8	1	12	...	14	2	137	...	57	...	28	...	85	...	21
48		...	1	...	7	...	17	2	4	...	2	...	3	2	33	...	31	...	12	...	43	...	3
50		...	...	...	1	...	...	...	1	...	...	...	...	...	2	...	5	...	...	...	5	...	...
Total		70	188	22	246	16	249	41	62	91	104	45	129	215	790	28	203	67	198	95	401	55	135
%M		27.1		8.2		6.0		39.8		46.7		25.9		21.4		12.1		25.3		19.2		28.9	

Appendix table 14a. Length-frequencies (nos.), by haul number and depth, and sex ratio (% males), of male and female Pacific ocean perch caught by the on-bottom (On-Xb) trawl of the F/V *Howe Bay*, at 200-239 m in Area 3Cn, September 1985. (Source: Leaman *et al.* 1988)

Haul		29		37		28		30		31		35		Total	
Depth	(m)	201		216		219		229		229		229		220	
	(fms)	110		118		120		125		125		125		120	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F
22		...	1	...	...	...	...	...	...	...	...	...	...	...	1
24		...	0	...	...	...	...	...	...	...	...	...	...	...	0
26		...	0	...	...	...	...	...	...	...	...	...	...	...	0
28		1	0	...	1	...	...	...	...	...	...	...	...	1	1
30		1	0	1	0	1	...	...	...	...	...	...	...	3	0
32		0	0	1	0	0	...	2	1			1		4	1
34		1	3	0	0	1	2	1	7	1	1	1	1	5	14
36		1	9	2	2	4	3	3	4	6	3	2	3	18	24
38		2	3	9	0	3	3	9	2	14	0	9	4	46	12
40		2	6	26	7	15	7	17	8	28	8	25	7	113	43
42		1	34	10	17	5	21	4	19	10	17	8	13	38	121
44		...	23	1	20	1	17	4	9	2	5	2	17	10	91
46		...	10	...	2	...	9	...	9	...	3	...	5	...	38
48		...	1	...	...	...	6	...	...	...	1	...	1	...	9
Total		9	90	50	49	30	68	40	59	61	38	48	51	238	355
%M		9.1		50.5		30.6		40.4		61.6		48.5		40.1	

Appendix table 14b. Length-frequencies (nos.), by haul number and depth, and sex ratio (% males), of male and female Pacific ocean perch caught by the on-bottom (On-Xb) trawl of the F/V *Howe Bay*, at 240-279 m in Area 3Cn, September 1985. (Source: Leaman *et al.* 1988)

Haul		50		63		53		64		66		44		62		Total	
Depth	(m)	243		247		256		256		256		274		274		260	
	(fms)	133		135		140		140		140		150		150		142	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
22		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24		...	...	...	...	...	...	...	...	...	1	1	...	...	...	1	1
26		...	...	...	...	1	...	...	1	...	0	0	...	...	1	1	2
28		...	1	...	...	0	...	...	0	1	0	0	...	2	0	3	1
30		...	0	...	...	1	1		0	4	0	1	...	5	0	11	1
32		...	2	...	...	1	1		0	2	1	1	2	2	3	6	9
34		1	3	1	1	4	5	1	0	5	2	4	6	1	2	17	19
36		2	1	1	0	8	2	3	5	9	2	3	3	8	1	34	14
38		15	0	11	0	22	2	12	3	23	7	12	1	19	5	114	18
40		49	2	23	9	37	3	27	10	12	13	15	10	21	6	184	53
42		16	2	9	26	6	2	10	12	1	11	7	14	5	13	54	80
44		3	2	...	15	1	3	...	12	...	2	...	17	...	4	4	55
46		...	...	...	3	...	...	...	3	...	1	...	2	...	1	...	10
48		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total		86	13	45	54	81	19	53	46	57	40	44	55	63	36	429	263
%M		86.9		45.5		81		53.5		58.8		44.4		63.6		62	

Appendix table 14c. Length-frequencies (nos.), by haul number and depth, and sex ratio (% males), of male and female Pacific ocean perch caught by the on-bottom (On-Xb) trawl of the F/V *Howe Bay*, at selected 40-m depth intervals (300-380) in Area 3Cn, September 1985. (Source: Leaman *et al.* 1988)

Haul		9		26		33		2		Total		14		45		Total		34	
Depth	(m)	280		282		283		302		300		326		338		340		380	
	(fms)	153		154		155		165		164		178		185		186		208	
Fork Length (cm)		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
22		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28		...	...	...	...	1	2	...	...	1	2	...	1	...	...	...	1	...	...
30		1	1	...	...	2	1	1	...	3	1	1	1	1	1	2	2	...	...
32		5	0	2	3	9	9	5	6	16	18	4	1	2	2	6	3	...	...
34		3	4	4	2	6	6	6	2	16	10	1	4	3	1	4	5	1	1
36		5	6	3	6	9	1	8	2	20	9	7	1	18	3	25	4	9	6
38		22	4	9	4	13	6	28	2	50	12	37	4	34	1	71	5	17	18
40		24	7	20	6	12	11	21	5	53	22	14	9	7	7	21	16	2	25
42		6	8	10	18	3	5	4	7	17	30	2	9	4	11	6	20	...	19
44		...	3	...	9	1	2	...	2	1	13	...	3	...	3	...	6	...	1
46		...	...	...	4	...	...	...	...	...	4	...	...	...	1	...	1	...	...
48		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total		66	33	48	52	56	43	66	33	170	128	66	33	69	30	135	63	29	70
%M		66.7		48.0		56.6		66.7		57.0		66.7		69.7		68.2		29.3	